Appendix C:
Excerpts from United Analytical Services, Inc., EMS Laboratories, Inc., and Aeolus, Inc. Reports of Sampling Results and QA/QC

Excerpts from United Analytical Services, Inc., EMS Laboratories, Inc., and Aeolus, Inc. Reports of Sampling Results and QA/QC

Note: Sampling location maps were generated with software that did not have sufficient resolution in some cases to clearly indicate the grid pattern recorded by global positioning that was used for sample collection. In addition, some of the maps of beach locations did not match actual beach locations and waterlines.

The results provided by United Analytical Services, Inc., EMS Laboratories, Inc., and Aeolus, Inc. are provided in this appendix. There are some differences between these results and final results and QA/QC calculated by UIC:

1. Locations of samples: Four samples that were collected between Kellogg Creek and 21st Street at IBSP North Unit were collected on the same date as samples collected at IBSP South Unit. These samples were labeled as IBSP-13S through IBSP-16S and included in the IBSP South Unit grouping by Aeolus, Inc., which was working from sample numbers and dates, and did not have all of the necessary information. GLCEEH subsequently corrected the sample results table as presented in Appendix A to reflect the IBSP North Unit grouping of results.
2. The shipment from EMS to UAS and the analysis of three samples of existing grid replicates had not been completed by the time the Aeolus, Inc. report was completed. These samples were subsequently analyzed and are included in the GLCEEH re-calculations included in Appendix B. During these re-calculations, minor data input errors were found in the Aeolus, Inc. QA/QC calculations, but these are not likely to impact the conclusions drawn by Aeolus, Inc.

FIELD DATA & LAB RESULTS

Beach Nourishment Sand Testing Project
Illinois Beach State Park - Lake County, IL
Using Agency: Illinois Department of Natural Resources
CDB Project No. 102-311-707

PREPARED FOR:

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EXPIRES 6-1-2009
PENNSYLVANIA 1960

March 10, 2005

I. Summary of Sampling Methods & Project Time-Line

The field sampling activities were performed in accordance with the Final Work Plan: *Evaluating Sand Nourishment Sources for Illinois Beach State Park* established by the Illinois Attorney General's Task Force (attached at end of this section). The scope of work outlined the four (4) beaches selected for sampling which included the following three (3) background beaches: Grant Park Beach in S. Milwaukee, WI; Highland Park Beach in Highland Park, IL; and Oak Street Beach in Chicago, IL. The target beach for comparison with the background areas was Illinois Beach State Park in Zion, IL.

The sampling protocol included the collection of twelve (12) samples, equally distributed across the length of each beach section as described in the Final Work Plan. Five (5) subsamples were collected on each of the 12 transects extending from the high water mark to the water line. The 12 transects and 5 subsampling locations were laid out by representatives from the Illinois State Geological Survey and University of Illinois at Chicago. Each subsample was collected to a depth of six inches below the ground surface providing a final dry sample weight between 1.0 and 2.0 kilograms of sand. For consistency, the subsamples were collected using a 4 inch diameter carbon steel bucket auger. All subsampling locations were plotted using a Magellan Meridian Gold GPS receiver.

It should be noted that Illinois Beach State Park was divided into the south and north unit (see attached memorandum dated September 13, 2004 in the Final Work Plan). Sand subsamples were collected at 12 sampling transects in the south unit and 12 sampling transects in the north unit. However, due to the width of the beach in the north unit, only three (3) subsamples were collected along the 12 transects using the same method.

The Final Work Plan also included collection of 12 lake-bottom sediment samples from the Waukegan Harbor Advanced Maintenance Area and North Point Marina following the systematic sampling method described in the Work Plan. This sampling was performed by the Illinois State Water Survey (ISWS) using the Vibrocoring System per Appendix D of the Work Plan and transported to the ISWS Lab in Peoria for final processing.

The wet subsamples were transported back to United Analytical Services, Inc. office for processing. Sample preparation and analysis was performed using the most current iteration of the USEPA guidenace *Superfund Method for the Determination of Releasable Asbestos in Soils and Bulk Materials* (EPA 540-R-97-028 and draft Revision 1 dated May 23, 2000) or appropriate adaptions approved by the Asbestos Task Force.

Laboratory preparation and analysis was performed in accordance with the Standard Operating Procedure (SOP) prepared by Dr. Wayne Berman (see Section II). The final analysis of the laboratory data and QA/QC data was also performed by Dr. Berman (see Section III).

The field sampling GPS plots, field logs, field data sheets and sampling processing logs are provided in Section IV of this report.

United Analytical Services, Inc. prepared the following time line for the field sampling activities, office preparation of samples, and delivery to the primary laboratory for analysis using the USEPA Elutriator Method. The time line for the QA/QC analysis and Dr. Berman's preparation of the Final Analysis of Laboratory Results & QA/QC Data are also provided.

Highland Park Beach

Field Sampling	June 30, 2004
Office Preparation Completed	August 26, 2004 (Shipped to Lab)
Laboratory Analysis Completed	October 7, 2004

Illinois Beach State Park

South Unit 12 Samples + North Unit 4 Samples

Field Sampling Completed	July 6, 2004
Office Preparation Completed	July 23, 2004 (Shipped to Lab)
Laboratory Analysis Completed	October 21, 2004

North Unit 8 Samples

Field Sampling Completed	September 24, 2004
Office Preparation Completed	October 8, 2004 (Shipped to Lab)
Laboratory Analysis Completed	November 29, 2004

Grant Park Beach

Field Sampling Completed	July 8, 2004
Office Preparation Completed	September 7, 2004 (Shipped to Lab)
Laboratory Analysis Completed	December 7, 2004

Oak Street Beach

Field Sampling Completed	July 14, 2004
Office Preparation Completed	September 14, 2004 (Shipped to Lab)
Laboratory Analysis Completed	November 17, 2004

Waukegan Harbor

Field Sampling Completed	July 20, 2004
Samples Collected from ISWS Lab	August 3, 2004
Office Preparation Completed	September 20, 2004 (Shipped to Lab)
Laboratory Analysis Completed	December 3, 2004

North Point Marina

Field Sampling Completed	July 21 & 22, 2004
Samples Collected from ISWS Lab	August 3, 2004
Office Preparation Completed	October 1, 2004 (Shipped to Lab)
Laboratory Analysis Completed	November 19, 2004

Project Time-Line (Continued)

United Analytical Services, Inc. QA/QC Analysis

UAS Receives 1st Four Samples	November 24, 2004
UAS Receives Two Additional Samples	December 3, 2004
UAS Receives One Additional Sample	December 14, 2004
UAS Received Final Three Samples	January 14, 2005

Dr. Wayne Berman's Analysis of Laboratory Results and QA/QC Data

UAS Receives Partial Preliminary Results	November 17, 2004
UAS QA/QC Complete for 7 Samples -Still reducing lab data	January 12, 2005
UAS Receives Preliminary Report	January 20, 2005
UAS QA/QC Complete for last 3 Samples	February 14, 2005 (delivered to UIC)
UAS Receives Final Report -Incorporates final revisions and comments per UIC review	February 21, 2005

STANDARD OPERATING PROCEDURE FOR THE COLLECTION OF SEDIMENT CORES USING THE ROSSFELDER P-3c VIBROCORE

1.0 Scope and Application

1.1 These procedures are used in the collection of sediment cores to ensure that all samples are representative of in-situ conditions for that location and to maintain the stratigraphic integrity of collected samples.

2.0 Summary of Method

2.1 The vibrocoring system employed by the Illinois State Water Survey (ISWS) is a model P-3c manufactured by Rossfelder Corporation of Ponway, California. The vibrocoring unit is submersible, weighs approximately 150 lbs and is powered by a three phase, 240 volt 60 Hz generator. The P-3c has a working depth of 4,000 ft. Sediment penetration is achieved through a method known as vibro-percussive where the unit delivers 16-24 KN (1 KN= 225 lbs.) of force and a vibration frequency of 3,450 vibrations per minute to the core tube. Coring is made possible by both the percussive force of the corer as well as the fact that the sediment particles surrounding the drive tube are "liquefied" by the vibrational forces along the tube. The corer is lowered into the sediment until the point of refusal. The unit is then engaged and coring proceeds until penetration ceases or the entire length of the drive tube is reached. Penetration depths and recovery rates depend on many factors such as the water content of the sediment, particle size and shapes, compaction / density, and even calcification. Therefore, the best results will always be obtained in unconsolidated, water-saturated, heterogeneous, sediments. There are no core sites that are exactly the same, thus predicting correct penetration depths cannot be done. Typical lake sediments, loams, or sands and gravel generally allow for complete penetration. Deposits of large cobble, non-hydrated clay lenses greater than 1 foot in thickness or the occurrence of large woody debris may inhibit coring. Currently the ISWS vibrocore is configured so that cores are approximately nine feet long when recovery is 100%.

3.0 Equipment

3.1 Pontoon Boat

3.2 Rossfelder P-3c Vibrocore

3.3 Drive Tube Assembly

4.0 Preparation of Sampling Equipment

4.1 Vibrocore

The vibrocore is a self-contained watertight unit and requires very little preparation before sampling. All electrical wires and connections should be checked for wear or damage. Hardware used in the rigging and clamps should also be inspected. During the first coring operation, and then periodically throughout the day, each leg of the 3-phase power supply should be checked to ensure equal voltage and amperage draw across all three legs to ensure that the vibrocore is operating properly.

4.2 Drive Tube Assembly

The drive tube assembly consists of three parts; the drive or core tube, the core tube liner, which is extruded High Density Polyethylene (HDPE); and the core or cutter nose. Integral to the core nose is a "core catcher" made from 0.010' stainless steel. This piece extends into the core tube and is cut into a series of radial biased fins. If the collected sediment core is drawn out of the core tube during extraction, these fingers will fold inward and inhibit loss of sample material. Preparation for the drive tube assembly varies according to whether the intended use of the collected sediment core is to supply sub-samples for geotechnical information or for chemical analysis.

4.2.1 Core tube

The core tube or drive tube requires little or no preparation before sampling since the core tube never contacts the sample. The core tube only supplies the structural integrity necessary for coring operations. The pre-drilled holes for attaching the core nose should be periodically inspected for wear or damage to ensure a proper fit with little or no play to avoid the rivets being cut by the core tube during operation.

4.2.2 HDPE Liner

4.2.2.1 Sub-sampling for Geotechnical Data

When sampling is being conducted for geotechnical samples the only preparation for the liner is to check the overall dimension of the liner to ensure a proper fit in the core tube. If any fugitive tube materials are observed where the tube was cut during production, these can be easily removed with a pocketknife or razor knife.

4.2.2.2 Sub-sampling for Chemical Analysis

When a sample is to be collected for chemical analysis a more thorough preparation of the liner is required. The liner should be checked to be sure that the length allows for proper assembly of the core tube to the vibrocore head. Any frayed liner material left from the factory cut should be removed. The liner is then washed with Ecolab Microtox® or an equivalent, and then rinsed with deionized water. Next, the tube will be rinsed with a 10% solution of nitric acid and then thoroughly rinsed once again with deionized water. After drying, the tube shall be capped at both ends and the caps taped in place. The tubes will remain capped throughout transportation and shall be uncapped only prior to being loaded into the core tube for coring operations.

4.2.3 Core nose

4.2.3.1 Sub-sampling for Geotechnical Data

The core nose is machined from a solid piece of 303-grade stainless steel. There is very little preparation required for the core nose when sampling for geotechnical purposes. The core nose should be inspected for wear or damage, especially to the cutting edge. Any dirt or sediments left on the core nose from previous sampling should be removed using a stiff brush with nylon or other inert material bristles. The core catcher should also be inspected and any residue remaining from previous sampling should be removed with a stiff brush and the core catcher rinsed in native water.

4.2.3.2 Sub-sampling for Chemical Analysis

When samples are being collected for chemical analysis the preparation of the core nose requires additional cleaning beyond what is necessary when sampling for geotechnical analysis. The core nose should be inspected for wear or damage, especially to the cutting edge. Any dirt or sediments left on the core nose from previous sampling should be removed using a stiff brush manufactured with inert materials. The core catcher should also be inspected and any residue remaining from previous sampling should be removed with a stiff brush and the catcher rinsed in native water. The core nose should then be washed in a similar manner as previously described for the liners. The core nose and catcher are first washed with Ecolab Micro-tox laboratory soap and subsequently rinsed with native water. The cutter nose and core catcher should then be rinsed with 10% nitric acid and then thoroughly rinsed with native water.

STANDARD OPERATING PROCEDURE FOR THE COLLECTION OF SEDIMENT CORES USING THE ROSSFELDER P-3C VIBROCORE

5.0 Deployment

5.1 Pontoon Boat

Vibrocoring operations are conducted from an 18' 6" pontoon boat. Coring operations occur through an opening in the deck or "moon pool" located approximately midship. To facilitate the deployment of the vibrocore, an electric winch and 16' deck mounted tetrapod (tower) are utilized. The tetrapod is assembled prior to launching as well as all cabling and electrical hookups. Generally, sampling occurs at predetermined locations. Station is maintained through the use of a three point anchoring system. Position is determined using a Differentially Corrected Global Positioning System (DGPS).

5.2 Rossfelder P-3c Vibrocore

The vibrocore is powered by a three phase, 240 volt 60 Hz generator located on deck. All connections between the generator and the vibrocore are screw type Impulse® watertight connectors. Deployment of the corer uses an electric hoist set up with a double line and rated for a maximum hoist of 6000 lbs. All shackles, pulleys, or other points of attachment are secured with clevis pins or seizing wire.

5.3 Drive Tube Assembly

The core tube is a 10 ft. section of 3.5" industrial pipe size (IPS) schedule 5 black iron pipe, having an OD of 4.0", a wall thickness of 0.083" and an ID of 3.834". The core tube is equipped with a cutter nose fabricated from 303-stainless steel and includes a 303-stainless steel core catcher to help ensure retention of the sample. The core tube and core nose incorporates a custom extruded HDPE liner with a wall thickness of 0.07". This facilitates the removal and transportation of collected cores and allows collected cores to be used for chemical analysis. The core tube is attached to the vibrocore head using an offset block clamp incorporated into the vibrocore head. The core nose is fixed to the drive tube using four rivets located at the quarter points of the drive tube.

6.0 Sampling

6.1 Vibrocoring

6.1.1 Coring

The collection of a core using the vibrocore should be done using the following procedures to ensure that the maximum percent recovery is attained and that the stratigraphic integrity of the sample is maintained. Once the boat has been successfully anchored with the proper scope to all anchors, the DGPS should be initialized. The sampler is then hoisted and all shackles and cabling should be visually checked to ensure the proper attitude of the sample. Depth of water is then determined using a graduated range pole equipped with a 6-inch foot to help define the water sediment interface. If water depths are too great for the use of a range pole then a calibrated fathometer is used. Water depth is then entered onto the coring log sheet. Once the depth of water is determined this depth is added to the length of the core tube from the bottom of the vibrocore head to the end of the core nose. This distance is then marked on the cabling above the vibrocore. If a double line shackle is being used, cored depth is determined by subtracting 1.2ft, to allow for the vibrocore itself, from the water depth and the top of the vibrocore is sounded. The vibrocore is then lowered using the hoist and is allowed to penetrate the sediment under its own weight until the drive tube has sufficiently penetrated the sediments to minimize disturbance to the surficial sediments during start-up or the point of refusal is reached. If the water is sufficiently shallow, the deck crew can manually oriented the vibrocore to ensure the correct vertical orientation. The corer is then switched on and is allowed to penetrate the sediments until it becomes apparent that penetration has ceased or the corer has penetrated the length of the drive tube. If the vibrocore has not penetrated the length of the drive tube when progress ceases, the distance from surface to the top of the corer is measured to determine the total depth achieved for that core. The resultant cored depth is then entered onto the coring log sheet.

6.1.2 Core Retrieval

When retrieving the core the hoist is re-engaged and the core is hoisted to the deck. The core should be hoisted high enough to allow the moonpool to be covered and the core tube is then lowered nose down onto the deck. The core tube is then removed from the clamp on the vibrocore head and the head lowered to the deck. Then remove the four rivets that fasten the core nose to the core tube with the core remaining upright. The core tube is then hoisted off the liner, again with the core remaining upright, and the drive tube is lowered to the deck. Any supernatant water remaining in the core tube is then siphoned off and the liner is removed at the top of the sediment and capped. A sample identification number, date, orientation (top) and sampling time are written on the cap. The core can now be laid down on the deck, the core nose removed, and the bottom end capped. The position of the core can now be taken from the DGPS unit and entered onto the core log sheet.

6.1.3 Core Transport and Storage

Requirements for the transportation and storage of collected cores will vary depending on the intended uses or analyses. The cores as collected are capped, labeled and sealed. There is limited chance for reordering of the core stratigraphy when the core tube has been properly cut and capped so there is no requirement that the core remain upright. In addition, while being transported on the boat the core tubes are placed within storage tubes constructed of schedule 40 PVC equipped with end caps. Since the tubes are completely enclosed there is no chance for distortion of the core due to flexing of the sample. When core retrieval is at or near 100%, core sample weights can approach 100 lbs. Care should be taken when handling samples to avoid injury and to avoid any flexing of the core sample to minimize any disturbance to the sample. Since cores commonly approach 10 feet in length, a vehicle capable of transporting this size material must be available.

Core samples by the nature of the collection technique limit exposure of the sample to atmospheric oxygen and possible oxidation of selected chemical constituents. If temperature is an important consideration then it may become necessary for samples to be immediately transported to a cold storage facility or sub-sampling may be required on site with appropriate storage of sub-samples. It is important that the plan of study for chemical analysis be clearly defined as constituents have specific requirements for holding times, temperature and material in which the sample is stored. Requirements for the storage and manipulation of sediment samples can be found in such reference materials as United States Environmental Protection Agency document EPA-823-B-01-002 and the 2000 ASTM Standards on Environmental Sampling, Vol. 11.05.

Sub-Sampling Routine for North Point Marina and Waukegan Harbor Vibrocore Sediment Samples

Sediment samples will be collected at North Point Marina and Waukegan harbor following the Illinois State Water Survey's (ISWS) Standard Operating Procedures (SOP) for the Collection of Vibrocore Sediment Samples on file with the ISWS Quality Assurance Officer.

The following procedures will be used by ISWS Sediment Laboratory personnel during the sample preparation and sub-sampling of collected core samples. Upon arrival at the Peoria Facility the cores will be logged on appropriate Chain of Custody (CoC) forms as having been received by the sediment laboratory. Sediment cores will be transported and stored to minimize any disturbance or mixing of the core contents and/or loss of water/moisture content. Cores are not required to be stored in climate controlled facilities although core samples should be stored in such a manner as to avoid extremes in temperature.

Once brought into the laboratory the HDPE liners will be scored using either a router or spiral zip saw to a depth that does not penetrate the liner. The core liner will then be cut along the score line using a stainless steel carpet knife. This procedure ensures that no curf material from the saw comes into contact with the sample. Opposing cuts are made in the liner and the sample is split into two equal halves, each still held by one half of the liner, using co-polymer wire.

The split core will be measured and visually inspected, briefly described as to color, texture, odors, and the presence of shells, plant materials or other identifiable material. Each core will be photographed for general documentation purposes, using a Nikon 950 digital camera. A compact disc containing all photographs in a .jpg format will be made available to the project sponsor.

Once the core has been documented, the core will be divided into five equal sections. The total designed sample depth for North Point Marina sediment cores will be four (4) feet, yielding subsections of 0.8 ft. (9.6 in.). The total designed sample depth for Waukegan Harbor Advanced Maintenance Area sediment cores will be six (6) feet, yielding subsections of 1.2 ft. (14.4 in.). If the length of the collected core is less than the designed sample depth, the core will be divided into five equal increments.

A representative from United Analytical Services, Inc. (UAS) will collect sub-samples from each of the 5 subsections of each core. Sub-sampling will be done such that the entire sampling design depth is represented.

All transferring of samples will be done in a clean laboratory environment and all equipment used to sub-sample the cores that may contact the sample material shall be washed and rinsed with de-ionized water before work on each discreet sample shall commence.

Once samples have been placed into the specific required container, the samples will be stored and shipped following the requirements of UAS. In order to meet standard CoC requirements, UAS will supply securable containers appropriate to meet the standard methods required for sample storage. Once UAS has assumed possession of the samples, the CoC should be signed and copies given to the ISWS laboratory. Signed CoC forms will serve as documentation of deliverables for this work effort.

SOP FOR PREPARATION AND ANALYSIS OF SAND SAMPLES USED TO SUPPORT THE EVALUATION OF NOURISHMENT SAND FOR ILLINOIS BEACH STATE PARK, WAUKEGAN, ILLINOIS

D. Wayne Berman, Ph.D.
Aeolus, Inc.
September 12, 2004

Field Preparation

Component samples are to be combined, weighed, and sieved to create each composite using the procedures indicated in Chapter 8 of the Superfund Method (Berman and Kolk 1997). Composite samples are to be homogenized and split using the procedures indicated in Chapter 8 of the Superfund Method to produce four aliquots of equal mass (quadruplet splits). The target mass for these aliquots is between 50 and 80 g and the masses of each individual aliquot should vary by no more than 15% from one another. One aliquot is to be archived in case of future need. Two aliquots (i.e. two splits from each sample) are to be sent to EMS Laboratories. The first of these will be analyzed by TEM as a project sample. The second will be stored in case it is selected as a QC sample.

Another homogenized split of each sample, with a target mass between 300 and 600 g is also being sent to EMS Laboratories to determine particle size (including silt content). So that the laboratory is not provided with information indicating which samples are duplicate splits of which others, samples shall be labeled in a manner that does not allow easy identification of homogenized splits. However, the specific set of samples to be analyzed and the relationship between samples to be analyzed for particle size and TEM will be communicated to the laboratory.

Laboratory Preparation of Samples for TEM Analysis

In general, samples are to be prepared using the procedures described in the Modified Elutriator Method (Berman and Kolk 2000) but with the following modifications. First, samples are to be evaluated to determine whether they contain a sufficient mass of material of respirable size to be handled in the traditional manner. For those not containing a sufficient mass of respirable material, sample filters are to be collected over the ME opening of the elutriator (rather than the IST opening).

Because the ability to produce uniformly loaded filters over the ME opening of the elutriator has not been firmly established, if this procedure is to be used, it will be necessary to conduct a preliminary test prior to running project samples for this project. To accomplish this, a sample known to contain reasonable concentrations of an easily distinguishable particulate material (it need not necessarily be asbestos)[1] within a larger matrix containing a reasonable concentration of respirable material shall be run through the elutriator with a minimum of two filters collected over the ME opening. These filters will then be prepared by the direct transfer procedure described in Berman and Kolk (2002) and the sample shall be analyzed by TEM with sufficient analytical sensitivity to assure a minimum of five of the unique particles of interest are counted on each of the five specimen grids prepared from the filter. Results of the analysis will then be subjected to a chi-square analysis (including adjustment for differences in the numbers of grid openings counted on each grid specimen, if needed). If both filters pass the chi-square test, collection of project samples over the ME opening of the elutriator will be deemed viable.

Once the viability of using the ME opening to collect project filters is established, samples containing limited masses of respirable material are to be prepared using the following procedure.

1. Weigh and dry sieve the aliquot provided for determination of particle size using a 200-mesh sieve to determine the silt content. This is needed to support later modeling of exposure and risk.

2. Unless it is possible to judge the period of time over which appropriately-loaded samples need to be collected over the ME opening can be determined by some other means, analyze the appropriate duplicate split for each sample using the pipette method (Appendix A) to establish the respirable fraction. This is required as an input to estimate the amount of time required to run the elutriator sample to obtain the required mass of deposit.

3. Based on the result of the particle size analysis, the amount of time required to collect a sample containing 130 μg of respirable dust shall be estimated.

4. The sample is then to be placed in the tumbler of the dust generator and properly conditioned per the procedures of the modified elutriator method. Note that, if the sample is kept in a humidity controlled environment prior to being placed in the elutriator, the time required for conditioning can be kept to a minimum.

5. Once the sample is conditioned, a new, pre-weighed polycarbonate filter shall be placed over the ME opening of the elutriator and the tumbler shall be turned on. Note that the tumbler shall not be run at greater than 120 rpm.

6. Accounting for the time required for dust to travel from the tumbler to the filters, a

1 Even if an asbestos sample is employed, it will be sufficient to count short asbestos structures. Thus, the loading and time required for scanning can be kept to a minimum.

sample filter shall then be collected over the ME opening of the elutriator for a time that, based on the calculated estimate, will be sufficient to collect 130 μg of respirable dust.

7. Sample filters shall then be weighed to determine the mass of dust actually deposited. A running record of actual versus predicted masses will also be kept and shall be used to determine whether adjustments are required to the procedure employed for estimating the time required to collect each sample filter. The objective is to produce filters containing dust masses that are as close as possible to the optimum mass for analysis following filter preparation by direct transfer while keeping the number of filters that are overloaded (which would potentially require preparation by indirect transfer) to an absolute minimum.

8. Sample filters are to be prepared by direct transfer for analysis using the procedures described for sample preparation in the Modified Elutriator Method (Berman and Kolk 2000).

9. To assure that sample collection over the ME opening of the elutriator remains viable, approximately 10% of the project samples shall be selected at random and evaluated for the uniformity of the filter deposit. This will be accomplished using surrogate particles that are easily distinguishable and known to be present within each selected sample. Good candidates for such analysis are the silica fibers that are known to exist within many of the sand samples to be analyzed. A sufficient number of grid openings shall be scanned on each of these samples to assure that a minimum of 3 structures are observed per grid specimen.

Laboratory Analysis by TEM

Use the counting and identification rules specified in ISO 10312 for determining asbestos concentrations with the following modifications:

- count only structures that satisfy the dimensions of either protocol structures or PCME structures;
- determine the number of grid openings required to achieve an analytical sensitivity of $1x10^6$ structures/g_{PM10}.. Define this number as "P."
- for each of the five specimen grids to be prepared from each sample filter, continue counting until one of the following obtains:
  - complete the scan of the grid opening on which the 3rd *protocol structure* longer than 10 μm is detected; or
  - scan a total of P/5 grid openings;

  whichever comes first.

Silt Content

Each aliquot selected for particle size determination shall first be weighed and then dry sieved using a 200-mesh to determine the silt content. The mass of material passing the 200-mesh sieve shall then be weighed and the ratio of the mass of material passing through the 200-mesh sieve to the total mass of the original material shall be reported as the silt content.

To the extent necessary to assist with judgements on filter loading, the mass fraction of respirable material in each sample shall be determined using the pipette method (Appendix A) as modified in the manner described in Appendix B. Results shall be used as described above to guide production of filters from samples containing only a limited mass of respirable material.

QC Sample Selection

The schedule for QC samples is provided in the attached Table 1. Samples shall be selected as follows:

- lott blanks. Two filters shall be collected at random from each lott of filters and shall be analyzed prior to use of filters from each respective lott;
- a sand blank shall be collected, run on the elutriator, and analyzed prior to initiating project sample runs. Sand blanks shall then be run after every seven project samples and shall be stored in case they are needed to design corrective actions. Unless project samples containing substantial numbers of structures are observed during the project, it will not be necessary to analyze additional sand blanks;
- within and between laboratory duplicate splits shall be selected as the project proceeds based on the results of project samples. Selection criteria will be based on observation of countable numbers of structures and on distributing the QC samples throughout the duration of the project.

Reference

Berman, D.W. and Kolk, A.J. *Draft: Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Materials, Revision 1.* Submitted to the U.S. Environmental Protection Agency, Region 8. May 23, 2000.

Berman, D.W. and Kolk, A.J. "Superfund Method for the Determination of Asbestos in Soils and Bulk Materials." Prepared for the Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency. EPA 540-R-97-028. 1997.

APPENDIX A:
PIPETTE METHOD FOR DETERMINATION OF PARTICLE SIZE

PARTICLE SIZE DETERMINATION (PIPETTE METHOD)

SEDIMENTATION PROCEDURE:

a- Cone and quarter a fresh sample to approximately 20 g. Using a analytical balance, weight to a precision of 0.0001 g.
b- Transfer the sample to an Erlenmeyer of 250 ml and add 10 ml of 30% H_2O_2.
c- When the reaction diminishes, add approximately 50-ml of distilled water and bring to a boil for 15 – 20 minutes. Watch carefully to prevent it from boiling over.
d- Remove from heat source and let cool.
e- Add 20 ml of sodium hexametaphosphate (i.e. Calgon), put caps on bottles, check for leaks, and put on the shaker. Leave samples on shaker overnight (or at least 6 hours).
f- Place a 62.5m m sieve over a large funnel and set in a 1000 ml cylinder (be careful, it may be unsteady). Remove the samples from the shaker and gently pour the sample through the sieve. Thoroughly wash all silt and clay through the sieve using distilled water. The entire sand fraction (very fine – very coarse) is now in the sieve. Carefully transfer all of the sand to a 50-ml beaker. Dry the sand and weigh.
g- The cylinder should now contain only the silt and clay fractions of the sample. Fill cylinders to the 1000-ml mark with distilled water.
h- Obtain 7 beakers (for each sample) and record their numbers and tare weights on the data sheet. These will be used for pipette "pulls" of the different size fractions ... vcs silt, cs silt, med silt, fn silt, vf silt, cs clay, vf clay. These guidelines for a detailed particle size analysis. If doing basic particle size, that is measuring only the amounts of sand, silt, and clay... only 2 beakers are necessary for pipette withdraw of the silt and clay fraction.
i- Measure and record the temperature of the water in the cylinder. Consult the settling time chart to determine the time and depth oat which "pulls" must be made for the various size fractions.
j- Agitate the sample vigorously for 20 seconds. Immediately after you cease stirring the sample, begin the time count for the first settling time.
k- At the required time, "pull" the fraction form a depth of 10 cm (use depths as instructed on settling time chart) using a 20 ml pipette.
l- Dispense the sediment sample from the pipette into the 50-ml beaker designated for that size fraction.
m- Wash pipette into beaker with distilled water
n- Place sample in drying oven
o- When dried, place is dessicator to cool, and weigh immediately.
p- Repeat steps "I" to "o" for remaining size fraction.

To figure the calgon correction factor (CCF), pipette 20 ml of Calgon into three separate beakers. Place in oven until dry, cool in dessicator and weigh immediately. Use the following equation to figure the mean;

Calgon (sodium hexametaphosphate) ----75g/2Liters H_2O ---solve for the mean of the three weights, then;

Mean/50 = CCF

Diameter of Particle (mm)	< .625	< .031	< .016	< .008	< .004	< .002	< .0005
Depth of Withdrawal (cm)	10	10	10	10	5	5	3
Time of Withdrawal	seconds	min'/sec"	min'/sec"	min'/sec"	min'/sec"	hour:/min'	hour/min
Temperature (Celsius)							
20	29	1' 55"	7' 40"	30' 40"	61" 19"	4: 05'	37: 21'
21	28	1' 52"	7' 29"	29' 58"	59' 50"	4: 00'	
22	27	1' 50"	7' 18"	29' 13"	58' 22"	3: 54'	
23	27	1' 47"	7' 08"	28' 34"	57' 05"	3: 48'	
24	26	1' 45"	6' 58"	27' 52"	55' 41"	3: 43'	33: 56'
25	25	1' 42"	6' 48"	27' 14"	54' 25"	3: 38'	
26	25	1' 40"	6' 39"	26' 38"	53' 12"	3: 33'	
27	24	1' 38"	6' 31"	26' 02"	52' 02"	3: 28'	
28	24	1' 35"	6' 22"	25' 28"	50' 52"	3: 24'	31: 00'
29	23	1' 33"	6' 13"	24' 53"	49' 42"	3: 10'	
30	23	1' 31"	6' 06"	24' 22"	48' 42"	3: 05'	

APPENDIX B:
MODIFICATION TO TRADITIONAL PIPETTE METHOD FOR PARTICLE SIZE DETERMINATION

Replace steps "n" and "o" of the Pipette method presented in Appendix A with the following:

(1) filter the suspension through a pre-weighed 0.45 µm MCE filter;

(2) thoroughly rinse the filtrate with water to remove any excess sodium hexametaphosphate;

(3) dry the sample to constant weight; and

(4) record the weight.

FINAL REPORT (FEBRUARY 2, 2005): SUMMARY OF PROJECT DATA AND QC ANALYSIS FOR THE PROJECT TO CHARACTERIZE ASBESTOS CONTAMINATION IN NOURISHMENT SAND FOR STATE OF ILLINOIS BEACHES

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Following is a brief report presenting the results from analyses of sand samples collected from numerous beaches and sediments around Lake Michigan. The purpose is to characterize asbestos concentrations in the samples collected and to evaluate the performance of the laboratories (and the consequent quality of the data) by further analyzing and interpreting the quality control samples that were also analyzed.

This work was performed in support of a project to characterize and compare asbestos concentrations at existing beaches and other candidate locations from which nourishment sand might be obtained for replenishing recreational beaches operated by the Illinois Department of Natural Resources. However, the interpretation of conditions at the various beaches to be derived from the data presented in this report is beyond the scope of this document.

Project Sample Analyses

Table 1 presents a summary of asbestos concentrations estimated for project samples collected and analyzed in support of this project. In Table 1, the first column indicates those samples in which no structures were detected; these are denoted as "NC". The second column indicates the sample identification number. The third column of the table indicates the analytical sensitivity (in str/g_{PM10}) that was achieved during analysis of each sample.

The next four columns of Table 1 report concentrations for chrysotile structures. These indicate, respectively, the concentration of total protocol structures[1], the fraction of such structures that are longer than 10 µm, the concentration of 7402 (PCME) structures[2], and the concentration of total structures longer than 5 µm. Note that, because protocol

1 Protocol structures are structures longer than 5 µm and thinner than 0.5 µm. Those longer than 10 µm are separately enumerated because they are believed to contribute more substantially to risk.

2 7402 structures are those longer than 5 µm and thicker than 0.25 µm each with aspect (length to width) ratios greater than 3. These structures are expected to represent the range of structures typically observed when analyses are performed by phase contrast microscopy (PCM).

structure and 7402 structure size categories are not mutually exclusive, the total number of structures longer than 5 µm may be less than the sum of protocol and 7402 structures that are reported in the table.

Columns 7 through 10 of Table 1 report concentrations for amphibole asbestos structures over the same size ranges as indicated for chrysotile structures in the previous paragraph. The last four columns of the table report concentrations for total asbestos structures (i.e. chrysotile and amphibole asbestos structures combined).

The numbers and types of asbestos structures observed in the various samples analyzed in this study are presented in Table 2. The first three columns of Table 2 present, respectively, an indication of those samples in which no structures were detected, the sample identification number, and the number of grid openings scanned during analysis of the indicated sample.

The next four columns of Table 2 provide counts of chrysotile structures. These indicate, respectively, the number of total protocol structures, the number of long protocol structures (longer than 10 µm), the number of 7402 structures, and the total number of chrysotile structures longer than 5 µm that were observed in each sample. The next four columns (Columns 8 through 11) in Table 2 provide counts of the same size range of structures for amphibole asbestos.

The 12th column of Table 2 indicates the number of non-asbestos structures reported by the analysts. Importantly, this may not represent the total number of non-asbestos structures observed in a sample, only the number of such structures that exhibit sufficiently similar morphology to asbestos to have required additional determination to identify their composition.

The last column of Table 2 indicates the types of amphibole structures observed in each sample. In this column:

- "A" means amosite;
- "Ac" means actinolite;
- "C" means crocidolite;
- "T" means tremolite; and
- "??" means amphibole type not definitively identified.

Quality Control

Evaluating the uniformity of sample filter deposits. To assure that concentrations estimated from counts of structures can be extrapolated to concentrations in sampled material with confidence, the adequacy of the filter deposit on each sample filter prepared for analysis was also evaluated. Because five grid specimens were prepared from each filter (at locations that are broadly distributed around the filter), counts from the five grid specimens of each sample were subjected to a chi-square analysis. If the counts across the five grid specimens from a single filter can be shown to be consistent, based on a chi-square test, then the deposit on the sample filter can be considered to be uniform and concentrations can be extrapolated with confidence.

Results of the chi-square analyses for every project filter on which at least one structure was observed are presented in Table 3A. Results for the quality control samples analyzed in this study are presented in table 3B. In both cases, chrysotile and amphibole structures were separately evaluated and, in both cases, counts of total structures longer than 5 μm were subjected to the chi square test.

The first columns of both Table 3A and 3B indicate the sample identification number. The next two columns indicate, respectively, the test statistic observed for chrysotile counts from the indicated sample and whether the counts can be considered to be consistent (based on a chi square). The fourth and fifth columns in each table indicate the same information for amphibole structures. Note that the tables are divided into two halves (to reduce table size) and identical information is presented in each half of each table (for different structures).

Because five grid specimens are being compared, the appropriate critical values for the chi square test is with four degrees of freedom (one less than the number of realizations of the counts evaluated). The critical value corresponding to a 0.05 level of significance for this test (with four degrees of freedom) is 9.49. Thus, whenever the test statistic is less than 9.49, the filter deposit can be considered to be uniform.

As can be seen in Table 3A, there are 64 sets of specimen grids on which at least one structure was observed so that a chi square test was conducted. It can also be seen from this table that there are only three out of the 64 tests for which the chi square statistic is larger than the critical value. However, at a 0.05 level of significance, one would expect three failures of the chi square test (among 64 tries) by chance alone. Thus, it is reasonable to conclude from the data presented in Table 3A that sample filters analyzed in this study are entirely uniform and results can be reasonably extrapolated to estimate concentrations in the sampled material.

A similar conclusion can also be drawn from the data presented in Table 3B. Although two failures among the 24 tests indicated is slightly higher than the one failure expected, this small difference is not sufficient to suggest a problem. In fact, we should also consider that there are more than 100 cases in which no chrysotile structures or (separately) no amphibole structures were detected on any of the grids in a set and that such cases represent "perfect" agreement with zero counts on each of five grid specimens. Thus, if these cases were to be included, we would expect more than 9 failures overall, while only five failures were observed.

Duplicate and replicate analyses. A series of duplicate splits and/or replicate analyses were also conducted on selected samples to further evaluate the performance of the laboratories participating in this study. In some cases, duplicate split samples were prepared and both pairs were analyzed (blind) by the primary laboratory for the study: EMS. This then represents a "within laboratory duplicate." In other cases, grid specimens prepared and analyzed by EMS for a selected sample were sent for replicate analysis by the quality control laboratory used in this study: United Analytical (UA). This represents a "between laboratory replicate." In still other cases, UA received a pair of duplicate splits to analyze with the identity of the splits concealed so that the analyses were conducted blind. This then represents a "within laboratory duplicate" for UA.

Results of the duplicate and replicate analyses conducted for this study were subjected to two types of comparisons. In Table 4, they are first compared using chi square tests, which tests for differences greater than what would be expected based on statistical variation in counting alone.

In Table 4, the first four columns indicate, respectively, an arbitrary replicate number assigned to each analysis within a group (to facilitate reference), the sample identification number, the laboratory that conducted the specific analysis, and the number of grid openings counted during each analysis.

The next four columns of the table provide the raw counts observed for chrysotile structures. These respectively indicate, the number of total protocol structures, the number of long protocol structures, the number of 7402 structures, and the total number of structures longer than 5 μm. The same information is presented for counts of amphibole structures in the next four columns of the table.

Columns 13 and 14 of Table 4 indicate, respectively, the number of degrees of freedom appropriate for the chi square test conducted across each group and the corresponding critical value for the test (corresponding to the 0.05 level of significance). In all cases, the number of degrees of freedom is one less than the number of analyses in the group of analyses evaluated.

Columns 15 through 17 of Table 4 provide results for chi square comparisons across counts of chrysotile structures. These indicate, respectively, the total number of chrysotile structures observed across each sample set evaluated, the test statistic calculated for the sample set, and the conclusions as to whether the sample set can be considered to be self-consistent (i.e. whether the test statistic exceeds the critical value). The last three columns of the table provide the same information for counts of amphibole structures. Note that, in all cases, chrysotile and amphibole structures were separately evaluated and counts of total structures longer than 5 μm were subjected to the chi square test.

As can be seen in Table 4, six of the 16 comparisons conducted using the chi square test found groups to be *not* consistent. This is substantially more than the one failure that would be expected by chance alone and suggests that additional sources of variation (in addition to statistical variation in counting) are contributing to the observed

[redacted]

differences between duplicate and replicate analyses. However, no clear pattern suggesting the source(s) of such variation are apparent in this table.

Importantly, applying a chi square test to compare results across duplicate and replicate samples of the type analyzed in this study is a severe test in that it allows for no sources of variation other than statistical variation in counting. Historically, analyses across duplicates or replicate counts by different laboratories for the method employed in this study show somewhat greater variation than expected based on statistical counting variation alone, although they still suggest excellent agreement. For this reason, the standard of performance that has been established for such duplicate and replicate counts is based on relative percent differences (RPD's) between pairs of analyses (rather than a chi square test).

An RPD is 100 times the difference between the concentrations observed across two analyses divided by the mean of the two analyses. For measurements obtained using Modified Elutriator Method (Berman and Kolk 2000), as in this study, it is generally expected that on half of such RPD's will be less than 50% and that nine-tenths of them will be less than 100%.

Results obtained by comparing duplicate and replicate analyses based on RPD's are provided in Table 5. In Table 5 (as in Table 4), the first four columns indicate, respectively, an arbitrary replicate number assigned to each analysis within a group (to facilitate reference), the sample identification number, the laboratory that conducted the specific analysis, and the number of grid openings counted during each analysis. Note that these are the same sets of analyses evaluated in Table 4.

The next four columns of Table 5 provide the estimated concentrations observed for chrysotile structures. These respectively indicate, the concentration of total protocol structures, the fraction of protocol structures that are longer than 10 µm, the concentration of 7402 structures, and the concentration of total structures longer than 5 µm. The same information is presented for counts of amphibole structures in the next four columns of the table.

Columns 13 and 14 of Table 5 indicate, respectively, the specific pair of analyses of each duplicate/replicate set for which a particular RPD has been calculated and the value of the RPD calculated. The same type of information is also presented in the last six columns (three pairs of columns) of the table. RPD's estimated based on chrysotile concentrations are presented in Columns 13 through 16. RPD's estimated based on amphibole concentrations are presented in Columns 17 through 20.

As can be seen in Table 5, four of the values reported for calculated RPD's reach 200%. This is the RPD value that automatically occurs when one of the pair of concentrations evaluated is zero. Thus, these values can be ignored because they do not provide any useful information.

[redacted]

Of the remaining 34 RPD's reported in Table 5, eight (23%) exceed 100% and 22 (65%) exceed 50%. Thus, a substantially greater fraction of the RPD's reported for this data set are larger than either 50% or 100% than has historically been achieved for measurements derived using the Modified Elutriator Method. Nevertheless, overall, the RPD's reported suggest that concentration estimates should be good to about a factor of three, which may be sufficient for satisfying the broader objectives of this study.

Evaluating the pattern of large RPD's reported in Table 5, the primary source of variation is also suggested. Of the eight values reported to be greater than 100% (excluding those reported as 200% for the reason indicated above), seven involve a comparison across replicate analyses between laboratories and only one involves a duplicate split within a laboratory. This suggests the possibility that differences in the way that the two laboratories interpret structures may be the primary source of variation among these quality control samples.

The above-stated hypothesis concerning sources of variation is further suggested by the fact that no check samples were run prior to commencing between laboratory analyses. Check samples (using verified counting) are commonly run at the beginning of a project employing multiple laboratories to calibrate against one another.

To better confirm the above-stated hypothesis, it may be prudent to complete the few additional QC samples remaining to be analyzed, which will allow better evaluation of within laboratory agreement for the second laboratory, UA. A sufficient number of within laboratory duplicates has already been completed for the primary laboratory, EMS.

REFERENCES

Berman, D.W. and Kolk, A.J. *Draft: Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Materials, Revision 1.* Submitted to the U.S. Environmental Protection Agency, Region 8. May 23, 2000.

TABLE 1:
SUMMARY OF CONCENTRATIONS FOUND IN NOURISHMENT SAND AT ILLINOIS STATE BEACHES

			Concentrations of Chrysotile Structures				Concentrations of Amphibole Structures				Concentrations of Total Asbestos Structures			
	Sample Number	Analytical Sensitivity* (s/g_{PM10})	Total Protocol Structures (s/g_{PM10})	Fraction Long Protocol (%)	7402 Structures (s/g_{PM10})	Total Long Structures (s/g_{PM10})	Total Protocol Structures (s/g_{PM10})	Fraction Long Protocol (%)	7402 Structures (s/g_{PM10})	Total Long Structures (s/g_{PM10})	Total Protocol Structures (s/g_{PM10})	Fraction Long Protocol (%)	7402 Structures (s/g_{PM10})	Total Long Structures (s/g_{PM10})
	WH-01A	1.0E+06					1.0E+06	100%	1.0E+06	1.0E+06	1.0E+06	100%	1.0E+06	1.0E+06
	WH-02A	9.7E+05	1.9E+06	100%		1.9E+06					1.9E+06	100%		1.9E+06
	WH-03A	9.8E+05	4.9E+06	80%	3.0E+06	5.9E+06	3.0E+06	100%	9.8E+05	3.0E+06	7.9E+06	88%	3.9E+06	8.9E+06
	WH-04A	9.4E+05	4.7E+06	100%	9.4E+05	4.7E+06	9.4E+05	100%	9.4E+05	9.4E+05	5.6E+06	100%	1.9E+06	5.6E+06
	WH-05A	9.6E+05	9.6E+05	100%		9.6E+05	9.6E+05	100%	9.6E+05	9.6E+05	1.9E+06	100%	9.6E+05	1.9E+06
	WH-06A	9.7E+05	3.9E+06	100%		3.9E+06					3.9E+06	100%		3.9E+06
	WH-07A	9.9E+05	2.1E+07	78%	1.1E+07	2.1E+07	4.0E+06	50%	2.0E+06	4.0E+06	2.5E+07	72%	1.3E+07	2.5E+07
	WH-08A	1.0E+06	2.0E+06	100%	2.0E+06	2.0E+06	2.0E+06	100%		2.0E+06	4.0E+06	100%	2.0E+06	4.0E+06
	WH-09A	9.9E+05	9.9E+05	100%	2.0E+06	2.0E+06	5.0E+06	100%	4.0E+06	7.0E+06	6.0E+06	100%	6.0E+06	9.0E+06
	WH-10A	9.7E+05	6.8E+06	57%	3.9E+06	6.8E+06					6.8E+06	57%	3.9E+06	6.8E+06
	WH-11A	9.9E+05	2.0E+06	100%	9.9E+05	2.0E+06	9.9E+05	100%	2.0E+06	2.0E+06	3.0E+06	100%	3.0E+06	4.0E+06
	WH-12A	9.7E+05	1.9E+06	100%		1.9E+06	9.7E+05	100%		9.7E+05	2.9E+06	100%		2.9E+06
NC	IBSP-01S	***9.7E+05***												
NC	IBSP-02S	9.9E+05												
NC	IBSP-03S	***9.9E+05***												
	IBSP-04S	9.7E+05	9.7E+05	0%		9.7E+05	9.7E+05	0%	2.9E+06	2.9E+06	1.9E+06	0%	2.9E+06	3.9E+06
NC	IBSP-05S	***9.8E+05***												
NC	IBSP-06S	***9.9E+05***												
NC	IBSP-07S	***1.0E+06***												
NC	IBSP-08S	***9.9E+05***												
NC	IBSP-09S	***1.0E+06***												
NC	IBSP-10S	***9.9E+05***												
NC	IBSP-11S	***9.9E+05***												
NC	IBSP-12S	***9.9E+05***												
NC	IBSP-13S	***1.0E+06***												
NC	IBSP-14S	***9.9E+05***												
	IBSP-15S	9.8E+05					9.8E+05	100%	2.0E+06	2.0E+06	9.8E+05	100%	2.0E+06	2.0E+06
	IBSP-16S	9.8E+05					9.8E+05	0%	9.8E+05	9.8E+05	9.8E+05	0%	9.8E+05	9.8E+05
	NEW SAMPLES FROM THIS BEACH:													
	IBSP-17A	9.9E+05					2.0E+06	50%	2.0E+06	2.0E+06	2.0E+06	50%	2.0E+06	2.0E+06
	IBSP-18A	9.3E+05	1.9E+06	100%		1.9E+06					1.9E+06	100%		1.9E+06
NC	IBSP-19A	9.8E+05												
	IBSP-20A	1.0E+06	1.0E+06	100%	1.0E+06	1.0E+06					1.0E+06	100%	1.0E+06	1.0E+06
	IBSP-21A	9.8E+05	9.8E+05	100%		9.8E+05					9.8E+05	100%		9.8E+05
	IBSP-22A	9.8E+05	9.8E+05	100%	9.8E+05	9.8E+05	3.9E+06	25%	3.9E+06	4.9E+06	4.9E+06	40%	4.9E+06	5.9E+06
NC	IBSP-23A	9.9E+05												
NC	IBSP-24A	9.9E+05												
NC	HPB-01A	***9.9E+05***												
NC	HPB-02A	***9.9E+05***												
NC	HPB-03A	***9.9E+05***												
	HPB-04A	9.7E+05			9.7E+05	9.7E+05							9.7E+05	9.7E+05
NC	HPB-05A	***9.9E+05***												
NC	HPB-06A	***1.0E+06***												
NC	HPB-07A	***9.9E+05***												
NC	HPB-08A	***9.9E+05***												
NC	HPB-09A	***9.9E+05***												
NC	HPB-10A	***9.8E+05***												
NC	HPB-11A	***1.0E+06***												
NC	HPB-12A	***9.9E+05***												
NC	GPB-01A	***1.0E+06***												
NC	GPB-02A	***1.0E+06***												
	GPB-03A	9.7E+05	9.7E+05	100%		9.7E+05					9.7E+05	100%		9.7E+05
NC	GPB-04A	***9.8E+05***												
NC	GPB-05A	***9.9E+05***												
NC	GPB-06A	***9.7E+05***												
NC	GPB-07A	***9.8E+05***												
NC	GPB-08A	***9.9E+05***												
NC	GPB-09A	***1.0E+06***												
	GPB-10A	9.6E+05							9.6E+05	9.6E+05			9.6E+05	9.6E+05
NC	GPB-11A	***1.0E+06***												
NC	GPB-12A	***9.9E+05***												
	OSB-01A	1.0E+06	4.0E+06	50%	4.0E+06	5.0E+06	1.7E+07	24%	1.5E+07	1.9E+07	2.1E+07	29%	1.9E+07	2.4E+07
	OSB-02A	9.8E+05	9.8E+05	0%		9.8E+05	9.8E+06	10%	5.9E+06	1.2E+07	1.1E+07	9%	5.9E+06	1.3E+07
	OSB-03A	9.9E+05	3.0E+06	67%	2.0E+06	4.0E+06	1.6E+07	25%	3.0E+07	3.8E+07	1.9E+07	32%	3.2E+07	4.2E+07
	OSB-04A	1.0E+06					1.1E+07	0%	9.0E+06	1.2E+07	1.1E+07	0%	9.0E+06	1.2E+07
NC	OSB-05A	9.8E+05												
	OSB-06A	9.8E+05	9.8E+05	100%		9.8E+05	2.9E+06	33%	2.9E+06	3.9E+06	3.9E+06	50%	2.9E+06	4.9E+06
	OSB-07A	9.8E+05					2.9E+06	33%	9.8E+05	2.9E+06	2.9E+06	33%	9.8E+05	2.9E+06
	OSB-08A	9.8E+05	9.8E+05	0%		9.8E+05	2.0E+06	50%	2.0E+06	2.9E+06	2.9E+06	33%	2.0E+06	3.9E+06
	OSB-09A	9.8E+05	9.8E+05	100%	2.0E+06	2.0E+06	2.0E+06	100%	2.0E+06	2.9E+06	2.9E+06	100%	3.9E+06	4.9E+06
	OSB-10A	1.0E+06	1.0E+06	100%	1.0E+06	1.0E+06					1.0E+06	100%	1.0E+06	1.0E+06
	OSB-11A	9.9E+05							9.9E+05	9.9E+05			9.9E+05	9.9E+05
	OSB-12A	9.9E+05					2.0E+06	50%	2.0E+06	2.0E+06	2.0E+06	50%	2.0E+06	2.0E+06
	NPM-01A	1.0E+06	1.0E+06	100%		1.0E+06	5.0E+06	40%	4.0E+06	5.0E+06	6.0E+06	50%	4.0E+06	6.0E+06
	NPM-02A	9.7E+05	9.7E+05	0%		9.7E+05	9.7E+05	100%	9.7E+05	9.7E+05	1.9E+06	50%	9.7E+05	1.9E+06
	NPM-03A	9.9E+05	3.9E+06	75%	9.9E+05	3.9E+06	9.9E+05	100%	9.9E+05	9.9E+05	4.9E+06	80%	2.0E+06	4.9E+06
	NPM-04A	9.7E+05			9.7E+05	9.7E+05	9.7E+05	100%	9.7E+05	1.9E+06	9.7E+05	100%	1.9E+06	2.9E+06
NC	NPM-05A	9.8E+05												
	NPM-06A	9.8E+05			9.8E+05	9.8E+05							9.8E+05	9.8E+05
	NPM-07A	9.8E+05	9.8E+05	0%		9.8E+05	9.8E+05	100%	2.0E+06	2.0E+06	2.0E+06	50%	2.0E+06	2.9E+06
NC	NPM-08A	9.8E+05												
	NPM-09A	9.9E+05					2.0E+06	0%	2.0E+06	2.0E+06	2.0E+06	0%	2.0E+06	2.0E+06
	NPM-10A	9.7E+05	9.7E+05	100%		9.7E+05					9.7E+05	100%		9.7E+05
NC	NPM-11A	9.9E+05												
	NPM-12A	9.8E+05					9.8E+05	100%	9.8E+05	9.8E+05	9.8E+05	100%	9.8E+05	9.8E+05

NOTES:

* Bolded and italicized values for analytical sensitivities represent approximations based on targeted numbers of grid openings counted rather than actual numbers of grid openings counted. The actual number of grid openings counted for samples with zero asbestos structures observed were not independently varified. In general the difference between estimated and counted numbers of grid openings is small so that the analytical sensitivities for these samples are expected to vary by less than 2%.

"NC" means no structures detected

TABLE 2:
SUMMARY OF STRUCTURE COUNTS AND ASBESTOS TYPES FOUND IN NOURISHMENT SAND AT ILLINOIS STATE BEACHES

			Chrysotile Structures				Amphibole Structures					
GS	Sample Number	Number G.O.s	Number Total Protocol	Number Long Protocol	Number 7402	Number Total Long	Number Total Protocol	Number Long Protocol	Number 7402	Number Total Long	NAM	Type of Amphibole
	WH-01A	295	0	0	0	0	1	1	1	1	0	A
	WH-02A	283	2	2	0	2	0	0	0	0	0	
	WH-03A	294	5	4	3	6	3	3	1	3	2	A,A,??
	WH-04A	274	5	5	1	5	1	1	1	1	0	A
	WH-05A	262	1	1	0	1	1	1	1	1	0	??
	WH-06A	270	4	4	0	4	0	0	0	0	0	
	WH-07A	258	21	16	11	21	4	2	2	4	0	A,A,A,A
	WH-08A	275	2	2	2	2	2	2	0	2	0	A,A
	WH-09A	285	1	1	2	2	5	5	4	7	4	A,A,A,??,A,A,A
	WH-10A	274	7	4	4	7	0	0	0	0	1	
	WH-11A	272	2	2	1	2	1	1	2	2	3	A,A
	WH-12A	274	2	2	0	2	1	1	0	1	1	A
NC	IBSP-01S	285	0	0	0	0	0	0	0	0	1	
	IBSP-02S	290	0	0	0	0	0	0	0	0	5	
NC	IBSP-03S	275	0	0	0	0	0	0	0	0	4	
	IBSP-04S	278	1	0	0	1	1	0	3	3	1	??,??,?? (all probably A)
NC	IBSP-05S	275	0	0	0	0	0	0	0	0	6	
NC	IBSP-06S	305	0	0	0	0	0	0	0	0*	5	
NC	IBSP-07S	290	0	0	0	0	0	0	0	0	4	
NC	IBSP-08S	265	0	0	0	0	0	0	0	0	2	
NC	IBSP-09S	265	0	0	0	0	0	0	0	0	1	
NC	IBSP-10S	285	0	0	0	0	0	0	0	0	2	
NC	IBSP-11S	280	0	0	0	0	0	0	0	0	1	
NC	IBSP-12S	280	0	0	0	0	0	0	0	0	1	
NC	IBSP-13S	265	0	0	0	0	0	0	0	0	0	
NC	IBSP-14S	295	0	0	0	0	0	0	0	0	0	
	IBSP-15S	278	0	0	0	0	1	1	2	2	1	A,Ac
	IBSP-16S	292	0	0	0	0	1	0	1	1	0	A
NEW SAMPLES FROM THIS BEACH												
	IBSP-17A	305	0	0	0	0	2	1	2	2	0	A, A
	IBSP-18A	300	2	2	0	2	0	0	0	0	0	
	IBSP-19A	292	0	0	0	0	0	0	0	0	0	
	IBSP-20A	273	1	1	1	1	0	0	0	0	0	
	IBSP-21A	264	1	1	0	1	0	0	0	0	4	
	IBSP-22A	296	1	1	1	1	4	1	4	5	3	T, T, C, Ac, Ac
	IBSP-23A	310	0	0	0	0	0	0	0	0	0	
	IBSP-24A	297	0	0	0	0	0	0	0	0	2	
NC	HPB-01A	265	0	0	0	0	0	0	0	0	0	
NC	HPB-02A	265	0	0	0	0	0	0	0	0	0	
NC	HPB-03A	285	0	0	0	0	0	0	0	0	0	
	HPB-04A	294	0	0	1	1	0	0	0	0	3	
NC	HPB-05A	265	0	0	0	0	0	0	0	0	0	
NC	HPB-06A	260	0	0	0	0	0	0	0	0	0	
NC	HPB-07A	295	0	0	0	0	0	0	0	0	0	
NC	HPB-08A	270	0	0	0	0	0	0	0	0	1	
NC	HPB-09A	285	0	0	0	0	0	0	0	0	0	
NC	HPB-10A	275	0	0	0	0	0	0	0	0	1	
NC	HPB-11A	290	0	0	0	0	0	0	0	0	2	
NC	HPB-12A	275	0	0	0	0	0	0	0	0	0	
NC	GPB-01A	280	0	0	0	0	0	0	0	0	0	
NC	GPB-02A	270	0	0	0	0	0	0	0	0	0	
	GPB-03A	286	1	1	0	1	0	0	0	0	3	
NC	GPB-04A	275	0	0	0	0	0	0	0	0	0	
NC	GPB-05A	270	0	0	0	0	0	0	0	0	0	
NC	GPB-06A	295	0	0	0	0	0	0	0	0	6	
NC	GPB-07A	280	0	0	0	0	0	0	0	0	0	
NC	GPB-08A	305	0	0	0	0	0	0	0	0	0	
NC	GPB-09A	265	0	0	0	0	0	0	0	0	2	
	GPB-10A	288	0	0	0	0	0	0	1	1	0	A
NC	GPB-11A	265	0	0	0	0	0	0	0	0	0	
NC	GPB-12A	270	0	0	0	0	0	0	0	0	0	
	OSB-01A	273	4	2	4	5	17	4	15	19	8	A-8,Ac-4,T-7
	OSB-02A	273	1	0	0	1	10	1	6	12	8	A-2,Ac-7,T-3
	OSB-03A	312	3	2	2	4	16	4	30	36	77	A-17,Ac-10,T-11
	OSB-04A	270	0	0	0	0	11	0	9	12	4	A-3,Ac-6,T-3
NC	OSB-05A	267	0	0	0	0	0	0	0	0	0	
	OSB-06A	271	1	1	0	1	3	1	3	4	1	Ac-4
	OSB-07A	268	0	0	0	0	3	1	1	3	4	A-1,Ac-2
	OSB-08A	272	1	0	0	1	2	1	2	3	0	A-1,Ac-2
	OSB-09A	282	1	1	2	2	2	2	2	3	5	A-1,Ac-2
	OSB-10A	300	1	1	1	1	0	0	0	0	0	
	OSB-11A	287	0	0	0	0	0	0	1	1	4	??
	OSB-12A	292	0	0	0	0	2	1	2	2	6	A-2
	NPM-01A	278	1	1	0	1	5	2	4	5	0	A-3,Ac-2
	NPM-02A	289	1	0	0	1	1	1	1	1	0	A
	NPM-03A	271	4	3	1	4	1	1	1	1	3	A
	NPM-04A	274	0	0	1	1	1	1	1	2	0	A-1,Ac-1
NC	NPM-05A	287	0	0	0	0	0	0	0	0	0	
	NPM-06A	267	0	0	1	1	0	0	0	0	0	
	NPM-07A	272	1	0	0	1	1	1	2	2	1	A-2
NC	NPM-08A	275	0	0	0	0	0	0	0	0	0	
	NPM-09A	285	0	0	0	0	2	0	2	2	3	A-2
	NPM-10A	289	1	1	0	1	0	0	0	0	4	
NC	NPM-11A	271	0	0	0	0	0	0	0	0	0	
	NPM-12A	282	0	0	0	0	1	1	1	1	1	Ac

Notes: "NC" means non detected, A means amosite, Ac means actinolite, C means crocidolite, T means tremolite, and ?? means not determined.

TABLE 3A:
RESULTS OF CHI-SQUARE ANAYSIS TO DETERMINE UNIFORMITY OF FILTER DEPOSITS

Sample Number	Chrysotile Test Statistic	Chrysotile Consistent?	Amphibole Test Statistic	Amphibole Consistent?
WH-01A	--		4.0	Yes
WH-02A	3.1	Yes	--	
WH-03A	10.7	No [a]	5.0	Yes
WH-04A	2.0	Yes	4.0	Yes
WH-05A	3.8	Yes	4.2	Yes
WH-06A	8.5	Yes	--	
WH-07A	8.0	Yes	6.1	Yes
WH-08A	8.0	Yes	3.0	Yes
WH-09A	3.1	Yes	8.4	Yes
WH-10A	6.5	Yes	--	
WH-11A	3.0	Yes	3.0	Yes
WH-12A	7.8	Yes	4.1	Yes
IBSP-01S	--		--	
IBSP-02S	--		--	
IBSP-03S	--		--	
IBSP-04S	4.0	Yes	11.9	No [b]
IBSP-05S	--		--	
IBSP-06S	--		--	
IBSP-07S	--		--	
IBSP-08S	--		--	
IBSP-09S	--		--	
IBSP-10S	--		--	
IBSP-11S	--		--	
IBSP-12S	--		--	
IBSP-13S	--		--	
IBSP-14S	--		--	
IBSP-15S	--		3.1	Yes
IBSP-16S	--		3.9	Yes
IBSP-17A	--		3.0	Yes
IBSP-18A	3.0	Yes	--	
IBSP-19A	--		--	
IBSP-20A	4.2	Yes	--	
IBSP-21A	4.1	Yes	--	
IBSP-22A	4.0	Yes	5.9	Yes
IBSP-23A	--		--	
IBSP-24A	--		--	
NPM-01A	4.1	Yes	2.0	Yes
NPM-02A	4.0	Yes	4.0	Yes
NPM-03A	3.4	Yes	4.0	Yes
NPM-04A	4.0	Yes	3.0	Yes
NPM-05A	--		--	
NPM-06A	4.0	Yes	--	

Sample Number	Chrysotile Test Statistic	Chrysotile Consistent?	Amphibole Test Statistic	Amphibole Consistent?
HPB-01A	--		--	
HPB-02A	--		--	
HPB-03A	--		--	
HPB-04A	4.1	Yes	--	
HPB-05A	--		--	
HPB-06A	--		--	
HPB-07A	--		--	
HPB-08A	--		--	
HPB-09A	--		--	
HPB-10A	--		--	
HPB-11A	--		--	
HPB-12A	--		--	
GPB-01A	--		--	
GPB-02A	--		--	
GPB-03A	4.1	Yes	--	
GPB-04A	--		--	
GPB-05A	--		--	
GPB-06A	--		--	
GPB-07A	--		--	
GPB-08A	--		--	
GPB-09A	--		--	
GPB-10A	--		4.0	Yes
GPB-11A	--		--	
GPB-12A	--		--	
OSB-01A	4.0	Yes	0.7	Yes
OSB-02A	4.1	Yes	5.4	Yes
OSB-03A	3.3	Yes	9.7	No [a]
OSB-04A	--		1.3	Yes
OSB-05A	--		--	
OSB-06A	4.0	Yes	3.5	Yes
OSB-07A	--		5.2	Yes
OSB-08A	4.0	Yes	2.0	Yes
OSB-09A	3.0	Yes	5.4	Yes
OSB-10A	4.0	Yes	--	
OSB-11A	--		4.0	Yes
OSB-12A	--		3.0	Yes
NPM-07A	4.0	Yes	3.0	Yes
NPM-08A	--		--	
NPM-09A	--		3.0	Yes
NPM-10A	4.0	Yes	--	
NPM-11A	--		--	
NPM-12A	--		3.9	Yes

Notes: The critical value at the 0.05 level of significance (with 4 degrees of freedom) is 9.49.

[a] Is consistent at the 0.025 level of significance

[b] Is consistent at the 0.01 level of significance

TABLE 3B:
RESULTS OF CHI-SQUARE ANAYSIS TO DETERMINE UNIFORMITY OF FILTER DEPOSITS ON QC SAMPLES

Sample Number	Chrysotile Test Statistic	Chrysotile Consistent?	Amphibole Test Statistic	Amphibole Consistent?
Wh-9B	5.4	Yes	3.0	Yes
WH-7B	2.5	Yes	4.1	Yes
WH-3B	5.8	Yes	4.0	Yes
OSB-3B	2.0	Yes	2.9	Yes
BSP-4B	--		9.3	Yes
GPB-12B	--		3.6	Yes

Sample Number	Chrysotile Test Statistic	Chrysotile Consistent?	Amphibole Test Statistic	Amphibole Consistent?
Wh-9A	3.0	Yes	8.0	Yes
WH-7BA	1.4	Yes	6.0	Yes
WH-3BA	**16.1**	**No** [a]	2.3	Yes
IBSP-5	4.0	Yes	6.0	Yes
OSB-3	4.3	Yes	**10.2**	**No**
OSB-1	1.8	Yes	4.2	Yes [b]
OSB-3	5.0	Yes	1.6	Yes

Notes

The critical value at the 0.05 level of significance (with 4 degrees of freedom) is 9.49.

[a] Is **NOT** consistent even at the 0.01 level of significance

[b] Is consistent at the 0.025 level of significance

TABLE 4:
SUMMARY OF RESULTS FOR CHI-SQUARE ANALYSES ACROSS DUPLICATE AND REPLICATE SAMPLES

				Chrysotile Structures				Amphibole Structures				Results from Chi-Square Analysis							
														Total Long Chrysotile Structures			Total Long Amphibole Structures		
Replicate Number	Sample Number	Laboratory	Number G.O.s	Number Total Protocol	Number Long Protocol	Number 7402	Total Long	Number Total Protocol	Number Long Protocol	Number 7402	Total Long	Number of Degrees of Freedom	Critical Value	Total Number of Structures	Test Statistic	Consistent?	Total Number of Structures	Test Statistic	Consistent?
a	Wh-9B	EMS	291	2	2	3	3	2	2	2	2	2	5.99	7	0.245	YES	16	3.296	YES
b	WH-09A	EMS	285	1	1	2	2	5	5	4	7								
c	WH-9	UA	280	1	1	0	2	3	3	4	7								
a	WH-7B	EMS	297	40	32	7	40	4	0	6	6	2	5.99	77	4.652	YES	15	3.467	YES
b	WH-07A	EMS	258	21	16	11	21	4	2	2	4								
c	WH-7	UA	106	13	12	4	16	4	3	3	5								
a	WH-3B	EMS	266	13	12	2	13	1	1	1	1	2	5.99	37	9.238	NO	6	0.988	YES
b	WH-03A	EMS	294	5	4	3	6	3	3	1	3								
c	WH-3	UA	213	16	10	2	18	2	2	2	2								
a	OSB-3B	EMS	293	2	2	2	3	42	13	38	57	3	7.81	21	13.617	NO	196	47.355	NO
b	OSB-03A	EMS	312	3	2	2	4	16	4	30	38								
c	OSB-3	UA	128	9	3	1	9	33	11	12	35								
d	OSB-3	UA	132	5	3	2	5	54	12	33	66								
a	BSP-4B	EMS	267	0	0	0	0	6	8	7	8	1	3.84	1	0.96	YES	11	2.48	YES
b	IBSP-04S	EMS	278	1	0	0	1	1	0	3	3								
a	GPB-12B	EMS	276	0	0	0	0	5	2	5	7	1	3.84	0	0	YES	7	6.849	NO
b	GPB-12A	EMS	270	0	0	0	0	0	0	0	0								
a	IBSP-05S	EMS	275	0	0	0	0	0	0	0	0	1	3.84	1	1.054	YES	4	4.215	No[a]
b	IBSP5	UA	270	1	0	1	1	3	2	2	4								
a	OSB-01A	EMS	273	4	2	4	5	17	4	15	19	1	3.84	11	2.329	YES	57	29.388	NO
b	OSB-1	UA	134	5	3	3	6	32	12	25	38								

Notes:

[a] This value is consistent at the 0.025 level of significance

TABLE 5:
SUMMARY OF RELATIVE PERCENT DIFFERENCE ANALYSES ACROSS DUPLICATE AND REPLICATE SAMPLES

Replicate Number	Sample Number	Laboratory	Number G.O.s	Concentration Chrysotile Structures: Total Protocol Structures	Fraction Long	7402 Structures	Total Long Structures	Concentration Amphibole Structures: Total Protocol Structures	Fraction Long	7402 Structures	Total Long Structures	Chrysotile Structures: Replicate Pairing	RPD	Replicate Pairing	RPD	Amphibole Structures: Replicate Pairing	RPD	Replicate Pairing	RPD
a	Wh-9B	EMS	291	2.0E+06	100%	3.0E+06	3.0E+06	2.0E+06	100%	2.0E+06	2.0E+06	a:b	40				111		
b	WH-09A	EMS	285	9.9E+05	100%	2.0E+06	2.0E+06	5.0E+06	100%	4.0E+06	7.0E+06	b:c	4				4		
c	WH-9	UA	280	1.0E+06	100%		2.1E+06	3.1E+06	100%	4.1E+06	7.2E+06	a:c	36				114		
a	WH-7B	EMS	297	3.9E+07	80%	6.9E+06	3.9E+07	3.9E+06	0%	5.9E+06	5.9E+06	a:b	61			a:b	39		
b	WH-07A	EMS	258	2.1E+07	76%	1.1E+07	2.1E+07	4.0E+06	50%	2.0E+06	4.0E+06	b:c	71			b:c	110		
c	WH-7	UA	106	3.6E+07	92%	1.1E+07	4.4E+07	1.1E+07	75%	8.3E+06	1.4E+07	a:c	11			a:c	80		
a	WH-3B	EMS	266	1.3E+07	92%	2.0E+06	1.3E+07	9.9E+05	100%	9.9E+05	9.9E+05	a:b	74			a:b	99		
b	WH-03A	EMS	294	4.9E+06	80%	3.0E+06	5.9E+06	3.0E+06	100%	9.8E+05	3.0E+06	b:c	116			b:c	18		
c	WH-3	UA	213	2.0E+07	63%	2.5E+06	2.2E+07	2.5E+06	100%	2.5E+06	2.5E+06	a:c	53			a:c	86		
a	OSB-3B	EMS	293	1.9E+06	100%	1.9E+06	2.9E+06	4.0E+07	31%	3.6E+07	5.4E+07	a:b	32			a:b	36		
b	OSB-03A	EMS	312	3.0E+06	67%	2.0E+06	4.0E+06	1.6E+07	25%	3.0E+07	3.8E+07	b:c	129			b:c	62		
c	OSB-3	UA	128	1.8E+07	33%	2.0E+06	1.8E+07	6.8E+07	33%	2.5E+07	7.2E+07	a:c	146	c:d	62	a:c	27	c:d	57
d	OSB-3	UA	132	9.7E+06	60%	3.9E+06	9.7E+06	1.0E+08	22%	6.4E+07	1.3E+08	b:d	84	a:d	109	b:d	#REFI	a:d	81
a	BSP-4B	EMS	267		0%			5.9E+06	100%	6.9E+06	7.9E+06	a:b	200*			a:b	92		
b	IBSP-04S	EMS	278	9.7E+05	0%		9.7E+05	9.7E+05	0%	2.9E+06	2.9E+06								
a	GPB-12B	EMS	276		0%			5.0E+06	40%	5.0E+06	7.0E+06	a:b	0			a:b	200*		
b	GPB-12A	EMS	270																
a	IBSP-05S	EMS	275									a:b	200*			a:b	200*		
b	IBSP5	UA	270	1.0E+06	0%	1.0E+06	1.0E+06	3.1E+06	67%	2.1E+06	4.1E+06								
a	OSB-01A	EMS	273	4.0E+06	50%	4.0E+06	5.0E+06	1.7E+07	24%	1.5E+07	1.9E+07	a:b	#REFI			a:b	121		
b	OSB-1	UA	134	1.0E+07	60%	6.1E+06	1.2E+07	6.5E+07	38%	5.1E+07	7.8E+07								

Notes:

* These RPD's represent the maximum possible values possible when at least one result of the pair is zero. Thus, these are artifacts of the manner in which RPD's are determined.

D. Wayne Berman, Aeolus, Inc.

DATE:	December 21, 2004	

CLIENT: United Analytical Services, Inc.
1515 Centre Circle Dr.
Downers Grove, IL 60515

ATTENTION: Kevin Aikman

REFERENCE: PO# 0491027-01
CDB# 102-311-707

REPORT NO: 96624

DATE OF SAMPLE COLLECTION: 09/24/04, Process Date 10/07/04 by Kevin Aikman

DATE RECEIVED: Various

SUBJECT: SIEVE ANALYSIS, ASTM C136-04

The following samples were received for analysis of the fraction of material that passes a No 200 sieve by dry sieving. ASTM Method C136-04 was used.
Samples IBSP-01S to -016S and samples HPB-01S to -05S were sieved at EMS Laboratories. The rest of the samples were done by Kleinfelder, Inc.
The results of the analysis are enclosed.

Lab No.	Date Received	No. of samples
95297	July 26, 2004	16
95938	August 30, 2004	12
96081	September 8, 2004	12
96168	September 15, 2004	12
96266	September 21, 2004	12
96458	October 4, 2004	12
96624	October 13, 2004	8

Respectfully submitted,
EMS LABORATORIES, INC.

AJKolk Jr.

A. J. Kolk Jr.
Technical Director
AJK/csl

Note: The report shall not be reproduced, except in full, without the written approval of EMS Laboratories, Inc.
Note: The results of the analysis are based upon the sample submitted to the laboratory. No representation is made regarding the sampling area other than that implied by the analytical results for the immediate vicinity of the samples analyzed as calculated from the data presented with those samples.
Any deviation or exclusion from the test method is noted in this cover letter. All the analytical quality control data meet the requirement of the procedure, unless otherwise indicated.
Unless otherwise noted in this cover letter the samples were received properly packaged, clearly identified and intact.

LABORATORY TEST RESULTS
REPORT DATE 12/17/04

LABORATORY ID	SAMPLE NO.	PASSING NO. 200 PERCENT
95297	IBSP-01S	1.26
	IBSP-02S	0.16
	IBSP-03S	0.05
	IBSP-04S	0.07
	IBSP-05S	0.03
	IBSP-06S	0.08
	IBSP-07S	0.03
	IBSP-08S	0.09
	IBSP-09S	0.08
	IBSP-10S	0.09
	IBSP-11S	0.06
	IBSP-12S	0.09
	IBSP-13S	0.04
	IBSP-14S	0.04
	IBSP-15S	0.05
	IBSP-16S	0.06
95938	HPB-01S	0.26
	HPB-02S	0.23
	HPB-03S	0.20
	HPB-04S	0.30
	HPB-05S	0.17

Reviewed by: Cliff Kolb

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 /626-568-4065

Laboratory Test Results

Project Name: EMS Laboratories
Project No.: 51994
Report Date: 12/2/04
KA Lab No.: 18306
EMS Lab No.: 96624
Sample ID.: IBSP

Percent of Material Finer than the No. 200 Sieve (ASTM C 136)

Sample No.	Passing No. 200
ISBP-17S	0.1%
ISBP-18S	0.2%
ISBP-19S	0.1%
ISBP-20S	0.1%
ISBP-21S	0.1%
ISBP-22S	0.3%
ISBP-23S	0.2%
ISBP-24S	0.5%

Reviewed By: CP

KLEINFELDER, INC. 3077 Fite Circle, Sacramento, CA 95827 (916) 366-1701 Fax (916) 366-7013

Laboratory Test Results

Project Name: EMS Laboratories
Project No.: 51994
Report Date: 12/2/04
KA Lab No.: 18306
EMS Lab No.: 96266
Sample ID.: WH

Percent of Material Finer than the No. 200 Sieve (ASTM C 136)

Sample No.	Passing No. 200
WH-01S	1.4%
WH-02S	5.3%
WH-03S	13.1%
WH-04S	18.7%
WH-05S	9.9%
WH-06S	13.2%
WH-07S	0.8%
WH-08S	1.9%
WH-09S	4.1%
WH-10S	11.5%
WH-11S	8.4%
WH-12S	22.6%

Reviewed By: CP

KLEINFELDER, INC. 3077 Fite Circle, Sacramento, CA 95827 (916) 366-1701 Fax (916) 366-7013

Laboratory Test Results

Project Name: EMS Laboratories
Project No.: 51994
Report Date: 12/2/04
KA Lab No.: 18306
EMS Lab No.: 96458
Sample ID.: NPM

Percent of Material Finer than the No. 200 Sieve (ASTM C 136)

Sample No.	Passing No. 200
NPM-01S	4.8%
NPM-02S	12.4%
NPM-03S	13.8%
NPM-04S	5.8%
NPM-05S	7.6%
NPM-06S	7.8%
NPM-07S	5.6%
NPM-08S	6.0%
NPM-09S	2.5%
NPM-10S	7.0%
NPM-11S	21.5%
NPM-12S	4.3%

Reviewed By: CP

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Laboratory Test Results

Project Name: EMS Laboratories
Project No.: 51994
Report Date: 12/2/04
KA Lab No.: 18306
EMS Lab No.: 96081
Sample ID.: GPB

Percent of Material Finer than the No. 200 Sieve (ASTM C 136)

Sample No.	Passing No. 200
GPB-01S	0.2%
GPB-02S	1.7%
GPB-03S	0.1%
GPB-04S	4.0%
GPB-05S	3.0%
GPB-06S	0.1%
GPB-07S	1.4%
GPB-08S	1.4%
GPB-09S	0.2%
GPB-10S	0.1%
GPB-11S	0.1%
GPB-12S	0.1%

Reviewed By: C—f

KLEINFELDER, INC. 3077 Fite Circle, Sacramento, CA 95827 (916) 366-1701 Fax (916) 366-7013

Laboratory Test Results

Project Name: EMS Laboratories
Project No.: 51994
Report Date: 12/2/04
KA Lab No.: 18306
EMS Lab No.: 96168
Sample ID.: OSB

Percent of Material Finer than the No. 200 Sieve (ASTM C 136)

Sample No.	Passing No. 200
OSB-01S	0.4%
OSB-02S	0.4%
OSB-03S	0.5%
OSB-04S	0.2%
OSB-05S	0.3%
OSB-06S	0.2%
OSB-07S	0.3%
OSB-08S	0.2%
OSB-09S	0.3%
OSB-10S	0.4%
OSB-11S	0.3%
OSB-12S	0.5%

Reviewed By: ____________

KLEINFELDER, INC. 3077 Fite Circle, Sacramento, CA 95827 (916) 366-1701 Fax (916) 366-7013

KLEINFELDER

Laboratory Test Results

Project Name: EMS Laboratories
Project No.: 51994
Report Date: 12/6/04
KA Lab No.: 18344
EMS Lab No.: 95538
Sample ID.: HPB

Percent of Material Finer than the No. 200 Sieve (ASTM C 136)

Sample No.	Passing No. 200
HPB-06S	0.2%
HPB-07S	0.8%
HPB-08S	0.3%
HPB-09S	0.2%
HPB-10S	0.2%
HPB-11S	0.1%
HPB-12S	0.2%

Reviewed By: CP

UNITED ANALYTICAL SERVICES, INC.

KLEINFELDER, INC. 3077 Fite Circle, Sacramento, CA 95827 (916) 366-1701 Fax (916) 366-7013

United
Analytical
Services, Inc

1515 Centre Circle Drive
Downers Grove, IL 60515-1382
630-691-8271 Fax: 630-691-1770

TEM LABORATORY REPORT

METHOD:	See Analyst Comments	REPORT DATE:	January 20, 2005
		DATE RECEIVED:	December 20, 2005
CLIENT:	United Analytical Services , Incorporated	UAS SAM #:	0410499
ATTENTION	Kevin Aikman	JOB LOCATION:	IBSP Sand Nourishment Project
FAX:	630-691-1819		#0491027-01 / CDB # 102-311-707

GRID OPENING AREA: 0.011 mm^2

Client Sample ID	Lab Sample #	# GO Analyzed	Volume of Sample Filtered (ml)	Area Analyzed mm^2	# of Structures	Asbestos Type (s) Present	Concentration (S/cm²)
WH-04	0410499-01	15	0.50	0.17	0	--	<6.06
WH-10	0410499-02	15	0.50	0.17	0	--	<6.06
IBSP-06	0410499-03	6	0.50	0.066	27	Chrysotile	409.09
IBSP-15	0410499-04	6	0.50	0.066	2 3	Amosite Chrysotile	75.76
HPB-04	0410499-05	6	0.50	0.066	66	Chrysotile	1000
HPB-11	0410499-06	6	0.50	0.066	4	Chrysotile	60.61
GPB-03	0410499-07	6	0.50	0.066	2	Chrysotile	30.30
GPB-09	0410499-08	6	0.50	0.066	2 2	Amosite Chrysotile	60.61
OSB-01	0410499-09	6	0.50	0.066	3	Chrysotile	45.45
OSB-10	0410499-10	6	0.50	0.066	1 6	Amosite Chrysotile	106.06

Analysis Comments:

1.) 10 grams of sand was sonicated in 100ml of fiber free water for 15 minutes in an Erlenmeyer Flask.
2.) After heavier components settled a 0.50 ml aliquot was collected from the top strata of the mixture in order to capture suspended asbestos.
3.) The 0.50 ml sample was brought to a volume of 20 ml with fiber free water and filtered through a TEM MCE filter.
4.) The filter was dried, etched and collapsed onto a microscope slide, carbon coated, and cleared onto TEM grids for analysis.
5.) Each sample was compared to spiked samples of, <1%, 1% and 2% asbestos (based on weight%).
6.) Each sample was quantified to obtain a comparison value for asbestos concentration.

Rebecca Frejek
ANALYZED BY- Rebecca Frejek

January 20, 2005
DATE ANALYZED

PLM & TEM

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PCM

AIHA Laboratory # 101212

United
Analytical
Services, Inc

1515 Centre Circle Drive
Downers Grove, IL 60515-1382
630-691-8271 Fax: 630-691-1770

TEM LABORATORY REPORT

METHOD: See Analyst Comments

CLIENT: United Analytical Services , Incorporated
ATTENTION Kevin Aikman
FAX: 630-691-1819

REPORT DATE: January 20, 2005
DATE RECEIVED: December 20, 2005
UAS SAM #: 0410499
JOB LOCATION: IBSP Sand Nourishment Project #0491027-01 / CDB # 102-311-707

GRID OPENING AREA: 0.011 mm^2

Client Sample ID	Lab Sample #	# GO Analyzed	Volume of Sample Filtered (ml)	Area Analyzed mm^2	# of Structures	Asbestos Type (s) Present	Concentration (S/cm^2)
Spike <1%	0410499-11	6	0.50	0.066	256	Chrysotile	38778.79
Spike 1%	0410499-12	1	0.50	0.011	Overloaded	Chrysotile	--
Spike 2%	0410499-13	1	0.50	0.011	Overloaded	Chrysotile	--

Analysis Comments:

1.) 10 grams of sand was sonicated in 100ml of fiber free water for 15 minutes in an Erlenmeyer Flask.
2.) After heavier components settled a 0.50 ml aliquot was collected from the top strata of the mixture in order to capture suspended asbestos.
3.) The 0.50 ml sample was brought to a volume of 20 ml with fiber free water and filtered through a TEM MCE filter.
4.) The filter was dried, etched and collapsed onto a microscope slide, carbon coated, and cleared onto TEM grids for analysis.
5.) Each sample was compared to spiked samples of, <1%, 1% and 2% asbestos (based on weight%).
6.) Each sample was quantified to obtain a comparison value for asbestos concentration.

Rebecca Frejek
ANALYZED BY- Rebecca Frejek

January 20, 2005
DATE ANALYZED

PLM & TEM

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AIHA Laboratory # 101212

United
Analytical
Services, Inc.

1515 Centre Circle Drive
Downers Grove, IL 60515-1770
630-691-8271 Fax: 630-691-1819

PLM LABORATORY REPORT

METHOD:	EPA/600/R-93/116 July 1993 PLM w/ Dispersion Staining	REPORT DATE:	January 20, 2005
CLIENT:	United Analytical Services, Inc.	DATE RECEIVED:	December 20, 2004
ATTENTION:	Kevin Aikman	UAS SAM#:	0410499
FAX:	N/A	JOB LOCATION:	IBSP Sand Nourishment Project - 0491027-01 CDB # 102-311-707

CLIENT SAMPLE #	LAB SAMPLE #	COLOR	DESCRIPTION/ LOCATION	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%
WH-04	0410499-01	Beige	Course Fraction	–	ND	CELL	PRESENT	SAND	PRESENT
WH-10	0410499-02	Beige	Course Fraction	–	ND	CELL	PRESENT	SAND	PRESENT
IBSP-06	0410499-03	Beige	Course Fraction	–	ND	CELL	PRESENT	SAND	PRESENT
IBSP-15	0410499-04	Beige	Course Fraction	–	ND	CELL	PRESENT	SAND	PRESENT
HPB-04	0410499-05	Beige	Course Fraction	–	ND	CELL	PRESENT	SAND	PRESENT
HPB-11	0410499-06	Beige	Course Fraction	–	ND	CELL	PRESENT	SAND	PRESENT

Analysis Comments:	CODES-ASBESTOS	CODES-OTHER FIBERS	CODES-MATRIX
Samples analyzed according to the EPA/600/R-93 166 July 1993 entitled Method for the Determination of Asbestos in Bulk Building Materials Further testing by gravimetric or TEM Methods are recommended for samples that are non-friable, i.e., floor tiles, mastics, etc. Report shall not be reproduced except in full, without the written approval of the laboratory. Laboratory results pertain to those delivered for analysis. Samples will be discarded if not notified by the client within 90 days.	ND-None Detected CHRY-Chrysotile AMOS-Amosite CROC-Crocidolite TREM-Tremolite ACTN-Actinolite ANTH-Anthophyllite	FBG-Fiber Glass CELL-Cellulose SYN-Synthetic WOLL-Wollastonite H-Hair O-Other(Specify)	G-Gypsum C-Calcium Carbonate M-Mica O-Other Matrix

Karla Smith-Kasten
ANALYZED BY-Karla Smith-Kasten

January 19, 2005
DATE ANALYZED

Rebecca Frejek
REVIEWED BY-Rebecca Frejek

January 20, 2005
DATE REVIEWED

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United Analytical Services, Inc.

1515 Centre Circle Driv
Downers Grove, IL 60515-177
630-691-8271 Fax: 630-691-181

PLM LABORATORY REPORT

METHOD:	EPA/600/R-93/116 July 1993 PLM w/ Dispersion Staining	REPORT DATE:	January 20, 2005
		DATE RECEIVED:	December 20, 2004
CLIENT:	United Analytical Services, Inc.	UAS SAM#:	0410499
ATTENTION:	Kevin Aikman	JOB LOCATION:	IBSP Sand Nourishment Project - 0491027-01
FAX:	N/A		CDB # 102-311-707

CLIENT SAMPLE #	LAB SAMPLE #	COLOR	DESCRIPTION/ LOCATION	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%
GPB-03	0410499-07	Beige	Course Fraction	--	ND	CELL	PRESENT	SAND	PRESENT
GPB-09	0410499-08	Beige	Course Fraction	--	ND	CELL FBG	PRESENT PRESENT	SAND	PRESENT
OSB-01	0410499-09	Beige	Course Fraction	--	ND	CELL FBG	PRESENT PRESENT	SAND	PRESENT
OSB-10	0410499-10	Beige	Course Fraction	--	ND	CELL	PRESENT	SAND	PRESENT

Analysis Comments:

Samples analyzed according to the EPA/600/R-93 166 July 1993 entitled Method for the Determination of Asbestos in Bulk Building Materials Further testing by gravimetric or TEM Methods are recommended for samples that are non-friable, i.e., floor tiles, mastics, etc. Report shall not be reproduced except in full, without the written approval of the laboratory. Laboratory results pertain to those delivered for analysis. Samples will be discarded if not notified by the client within 90 days.

CODES-ASBESTOS	CODES-OTHER FIBERS	CODES-MATRIX
ND-None Detected	FBG-Fiber Glass	G-Gypsum
CHRY-Chrysotile	CELL-Cellulose	C-Calcium Carbonate
AMOS-Amosite	SYN-Synthetic	M-Mica
CROC-Crocidolite	WOLL-Wollastonite	O-Other Matrix
TREM-Tremolite	H-Hair	
ACTN-Actinolite	O-Other(Specify)	
ANTH-Anthophyllite		

Karla Smith-Kasten
ANALYZED BY-Karla Smith-Kasten

January 19, 2005
DATE ANALYZED

Rebecca Frejek
REVIEWED BY-Rebecca Frejek

January 20, 2005
DATE REVIEWED

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NVLAP Laboratory # 101732

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AIHA Laboratory # 101212

This report must not be used by the client to claim product endorsement by AIHA, NVLAP or any agency of the United States Government.

United
Analytical
Services, Inc.

1515 Centre Circle Drive
Downers Grove, IL 60515-1770
630-691-8271 Fax: 630-691-1819

PLM POINT COUNT LABORATORY REPORT

METHOD:	EPA/600/R-93/116 July 1993 PLM w/ Dispersion Staining	REPORT DATE:	January 20, 2005
CLIENT:	United Analytical Services, Inc	DATE RECEIVED:	December 20, 2004
ATTENTION:	Kevin Aikman	UAS SAM#:	0410499
FAX:	NA	JOB LOCATION:	IBSP Sand Nourishment Project - 0491027-01 CDB # 102-311-707

CLIENT SAMPLE #	LAB SAMPLE #	COLOR	DESCRIPTION/ LOCATION	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%
WH-04	0410499-01	Beige	Sand Fraction	–	ND	–	–	SAND	PRESENT
IBSP-06	0410499-03	Beige	Sand Fraction	–	ND	–	–	SAND	PRESENT
HPB-04	0410499-05	Beige	Sand Fraction	–	ND	–	–	SAND	PRESENT
GPB-04	0410499-07	Beige	Sand Fraction	–	ND	–	–	SAND	PRESENT
OSB-01	0410499-09	Beige	Sand Fraction	–	ND	–	–	SAND	PRESENT

Analysis Comments:

Samples analyzed according to the EPA/600/R-93 166 July 1993 entitled Method for the Determination of Asbestos in Bulk Building Materials Further testing by gravimetric or TEM Methods are recommended for samples that are non-friable, i.e., floor tiles, mastics, etc. Report shall not be reproduced except in full, without the written approval of the laboratory. Laboratory results pertain to those delivered for analysis. Samples will be discarded if not notified by the client within 90 days.

CODES-ASBESTOS	CODES-OTHER FIBERS	CODES-MATRIX
ND-None Detected	FBG-Fiber Glass	G-Gypsum
CHRY-Chrysotile	CELL-Cellulose	C-Calcium Carbonate
AMOS-Amosite	SYN-Synthetic	M-Mica
CROC-Crocidolite	WOLL-Wollastonite	O-Other Matrix
TREM-Tremolite	H-Hair	
ACTN-Actinolite	O-Other(Specify)	
ANTH-Anthophyllite		

ANALYZED BY-Karla Smith-Kasten

January 17, 2005
DATE ANALYZED

REVIEWED BY-Rebecca Frejek

January 20, 2005
DATE REVIEWED

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Downers Grove, IL 60515-1770
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PLM POINT COUNT LABORATORY REPORT

METHOD:	EPA/600/R-93/116 July 1993 PLM w/ Dispersion Staining	REPORT DATE:	January 20, 2005
		DATE RECEIVED:	December 20, 2004
CLIENT:	United Analytical Services, Inc	UAS SAM#:	0410499
ATTENTION:	Kevin Aikman	JOB LOCATION:	IBSP Sand Nourishment Project - 0491027-01 CDB # 102-311-707
FAX:	NA		

CLIENT SAMPLE #	LAB SAMPLE #	COLOR	DESCRIPTION/ LOCATION	ASBESTOS TYPE	%	OTHER FIBERS	%	MATRIX	%
--	SPIKE CHRY <1%	Beige	(Sand) 9.9674 gr + (Chry) .0334 gr Total 10.0008 grams 10 Minute Rest 1/2 ml	CHRY	<1%	--	--	SAND	Present
--	SPIKE CHRY 1%	Beige	(Sand) 8.9932 gr + (Chry) .1007 gr Total 10.0002 grams 10 Minute Rest 1/2 ml	CHRY	3.00%	--	--	SAND	Present
--	SPIKE CHRY 2%	Beige	(Sand) 9.8006 gr + (Chry) .2001 gr Total 10.0007 grams 10 Minute Rest 1/2 ml	CHRY	4.00%	--	--	SAND	Present

Analysis Comments:	CODES-ASBESTOS	CODES-OTHER FIBERS	CODES-MATRIX
Samples analyzed according to the EPA/600/R-93 166 July 1993 entitled Method for the Determination of Asbestos in Bulk Building Materials Further testing by gravimetric or TEM Methods are recommended for samples that are non-friable, i.e., floor tiles, mastics, etc. Report shall not be reproduced except in full, without the written approval of the laboratory. Laboratory results pertain to those delivered for analysis. Samples will be discarded if not notified by the client within 90 days.	ND-None Detected CHRY-Chrysotile AMOS-Amosite CROC-Crocidolite TREM-Tremolite ACTN-Actinolite ANTH-Anthophyllite	FBG-Fiber Glass CELL-Cellulose SYN-Synthetic WOLL-Wollastonite H-Hair O-Other(Specify)	G-Gypsum C-Calcium Carbonate M-Mica O-Other Matrix

ANALYZED BY-Karla Smith-Kasten

January 17, 2005
DATE ANALYZED

REVIEWED BY-Rebecca Frejek

January 20, 2005
DATE REVIEWED

PLM & TEM

NVLAP Laboratory # 101732

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AIHA Laboratory # 101212

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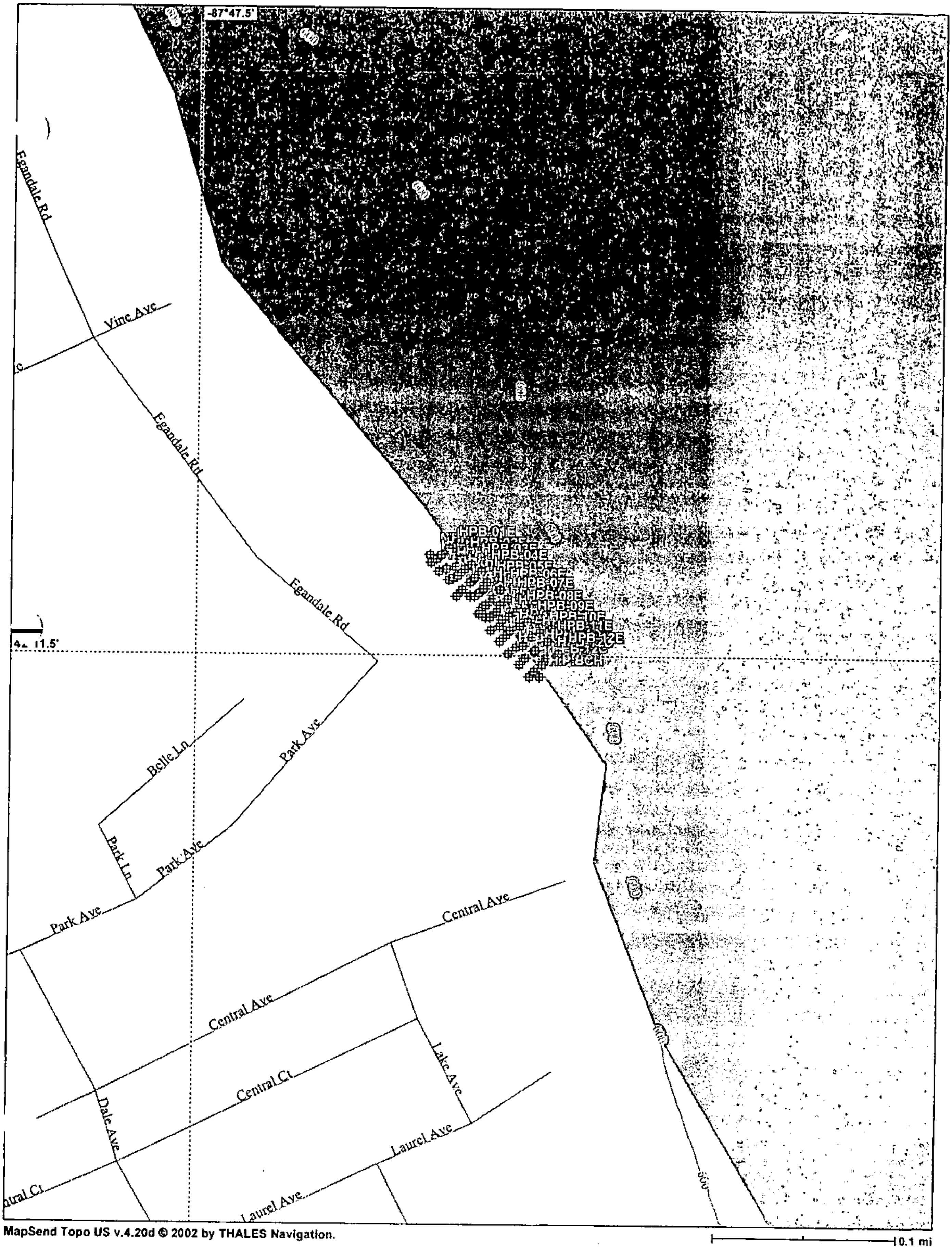
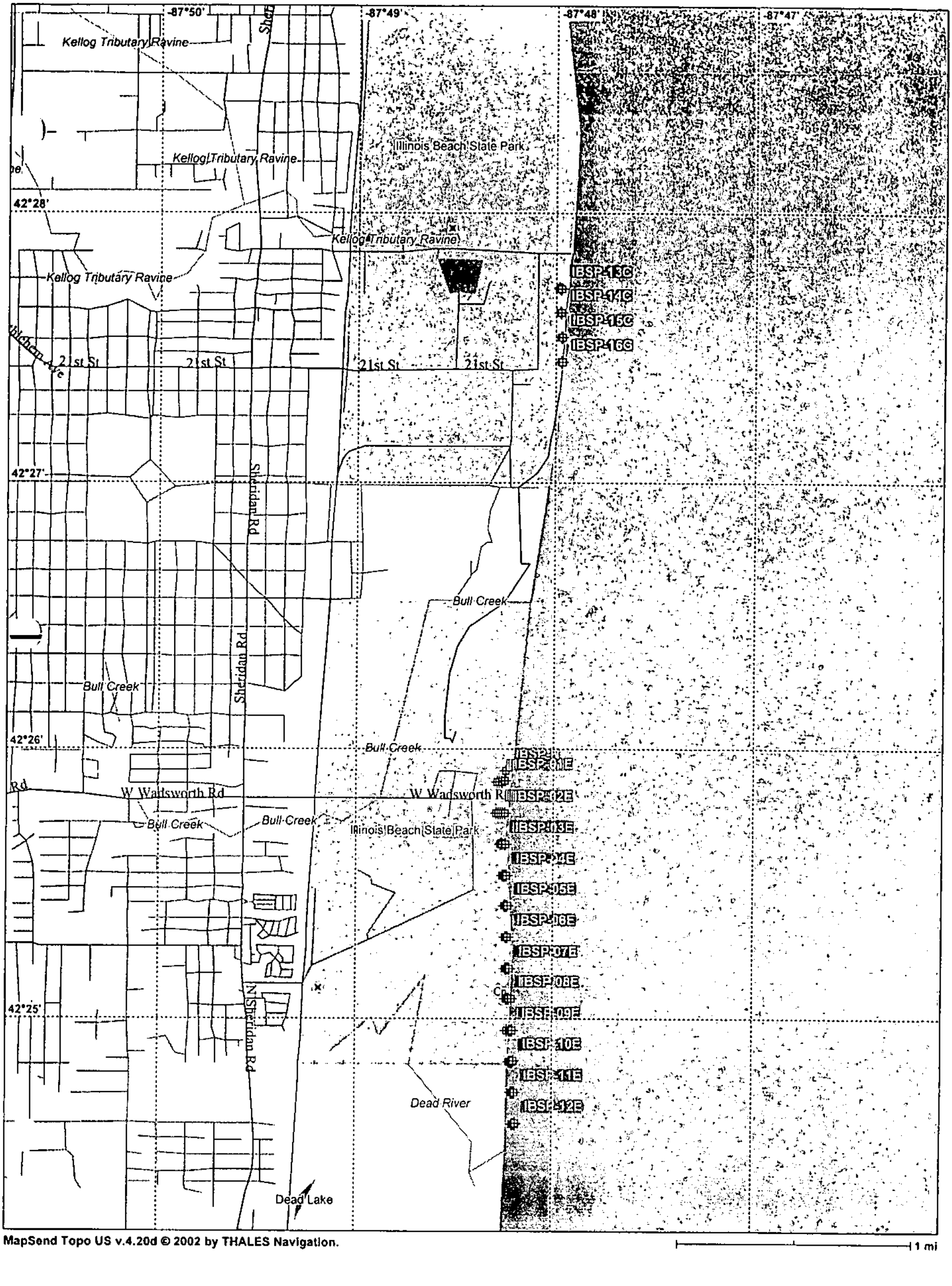


MapSend Topo US v.4.20d © 2002 by THALES Navigation.

Highland Park Beach GPS Log from Beach Sand Sampling on June 30, 2004; CDB Project No. 102-311-707.

#	Name	Icon	Message	Latitude	Longitude	Altitude (ft)	Latitude (degrees)	Longitude (degrees)	Icon ID
1	N LIMIT	Crossed Square	HIGHLAND PARK BEACH	N42°11.548'	W87°47.352'	568	42.19246667	-87.78920000	a
2	HPB-01A	Crossed Square	HPB HIGH WATER MARK	N42°11.544'	W87°47.351'	581	42.19240000	-87.78918333	a
3	HPB-01B	Crossed Square		N42°11.546'	W87°47.348'	581	42.19243333	-87.78913333	a
4	HPB-01C	Crossed Square		N42°11.548'	W87°47.345'	581	42.19246667	-87.78908333	a
5	HPB-01D	Crossed Square		N42°11.550'	W87°47.341'	574	42.19250000	-87.78901667	a
6	HPB-01E	Crossed Square		N42°11.551'	W87°47.340'	571	42.19251667	-87.78900000	a
7	HPB-02A	Crossed Square	LINE 2-HIGH WATER MARK	N42°11.540'	W87°47.346'	591	42.19233333	-87.78910000	a
8	HPB-02B	Crossed Square		N42°11.541'	W87°47.342'	587	42.19235000	-87.78903333	a
9	HPB-02C	Crossed Square		N42°11.541'	W87°47.341'	607	42.19235000	-87.78901667	a
10	HPB-02D	Crossed Square		N42°11.542'	W87°47.336'	617	42.19236667	-87.78893333	a
11	HPB-02E	Crossed Square		N42°11.546'	W87°47.333'	597	42.19243333	-87.78888333	a
12	HPB-03A	Crossed Square	LINE 3 HIGH WATER MARK	N42°11.536'	W87°47.340'	587	42.19226667	-87.78900000	a
13	HPB-03B	Crossed Square		N42°11.537'	W87°47.337'	584	42.19228333	-87.78895000	a
14	HPB-03C	Crossed Square		N42°11.538'	W87°47.334'	587	42.19230000	-87.78890000	a
15	HPB-03D	Crossed Square		N42°11.541'	W87°47.330'	577	42.19235000	-87.78883333	a
16	HPB-03E	Crossed Square		N42°11.543'	W87°47.326'	587	42.19238333	-87.78876667	a
17	HPB-04A	Crossed Square	LINE 4-HIGH WATER MARK	N42°11.528'	W87°47.335'	627	42.19213333	-87.78891667	a
18	HPB-04B	Crossed Square		N42°11.531'	W87°47.332'	594	42.19218333	-87.78886667	a
19	HPB-04C	Crossed Square		N42°11.535'	W87°47.327'	571	42.19225000	-87.78878333	a
20	HPB-04D	Crossed Square		N42°11.537'	W87°47.324'	571	42.19228333	-87.78873333	a
21	HPB-04E	Crossed Square		N42°11.540'	W87°47.320'	558	42.19233333	-87.78866667	a
22	HPB-05A	Crossed Square	LINE 5-HIGH WATER MARK	N42°11.528'	W87°47.327'	561	42.19213333	-87.78878333	a
23	HPB-05B	Crossed Square		N42°11.528'	W87°47.324'	571	42.19213333	-87.78873333	a
24	HPB-05C	Crossed Square		N42°11.530'	W87°47.321'	587	42.19216667	-87.78868333	a
25	HPB-05D	Crossed Square		N42°11.532'	W87°47.318'	577	42.19220000	-87.78863333	a
26	HPB-05E	Crossed Square		N42°11.535'	W87°47.316'	571	42.19225000	-87.78860000	a
27	HPB-06A	Crossed Square	LINE 6-HIGH WATER MARK	N42°11.520'	W87°47.321'	584	42.19200000	-87.78868333	a
28	HPB-06B	Crossed Square		N42°11.523'	W87°47.319'	577	42.19205000	-87.78865000	a
29	HPB-06C	Crossed Square		N42°11.524'	W87°47.317'	581	42.19206667	-87.78861667	a
30	HPB-06D	Crossed Square		N42°11.527'	W87°47.312'	587	42.19211667	-87.78853333	a
31	HPB-06E	Crossed Square		N42°11.531'	W87°47.308'	581	42.19218333	-87.78846667	a
32	HPB-07A	Crossed Square	LINE 7-HIGH WATER MARK	N42°11.518'	W87°47.317'	587	42.19196667	-87.78861667	a
33	HPB-07B	Crossed Square		N42°11.518'	W87°47.314'	591	42.19196667	-87.78856667	a
34	HPB-07C	Crossed Square		N42°11.521'	W87°47.310'	591	42.19201667	-87.78850000	a

35	HPB-07D	Crossed Square		N42°11.524'	W87°47.308'	587	42.19206667	-87.78846667	a
36	HPB-07E	Crossed Square		N42°11.527'	W87°47.303'	584	42.19211667	-87.78838333	a
37	HPB-08A	Crossed Square	LINE8-HIGH WATER MARK	N42°11.512'	W87°47.313'	594	42.19186667	-87.78855000	a
38	HPB-08B	Crossed Square		N42°11.514'	W87°47.308'	591	42.19190000	-87.78846667	a
39	HPB-08C	Crossed Square		N42°11.517'	W87°47.306'	597	42.19195000	-87.78843333	a
40	HPB-08D	Crossed Square		N42°11.519'	W87°47.302'	597	42.19198333	-87.78836667	a
41	HPB-08E	Crossed Square		N42°11.521'	W87°47.297'	594	42.19201667	-87.78828333	a
42	HPB-09A	Crossed Square	LINE 9-HIGH WATER MARK	N42°11.507'	W87°47.308'	604	42.19178333	-87.78846667	a
43	HPB-09B	Crossed Square		N42°11.510'	W87°47.304'	587	42.19183333	-87.78840000	a
44	HPB-09C	Crossed Square		N42°11.512'	W87°47.301'	600	42.19186667	-87.78835000	a
45	HPB-09D	Crossed Square		N42°11.514'	W87°47.295'	581	42.19190000	-87.78825000	a
46	HPB-09E	Crossed Square		N42°11.516'	W87°47.290'	591	42.19193333	-87.78816667	a
47	HPB-10A	Crossed Square	LINE 10-HIGH WATER LINE	N42°11.501'	W87°47.302'	610	42.19168333	-87.78836667	a
48	HPB-10B	Crossed Square		N42°11.504'	W87°47.297'	607	42.19173333	-87.78828333	a
49	HPB-10C	Crossed Square		N42°11.505'	W87°47.293'	600	42.19175000	-87.78821667	a
50	HPB-10D	Crossed Square		N42°11.509'	W87°47.288'	600	42.19181667	-87.78813333	a
51	HPB-10E	Crossed Square		N42°11.511'	W87°47.283'	620	42.19185000	-87.78805000	a
52	HPB-11A	Crossed Square	LINE 11-HIGH WATER MARK	N42°11.496'	W87°47.295'	600	42.19160000	-87.78825000	a
53	HPB-11B	Crossed Square		N42°11.499'	W87°47.292'	591	42.19165000	-87.78820000	a
54	HPB-11C	Crossed Square		N42°11.502'	W87°47.286'	587	42.19170000	-87.78810000	a
55	HPB-11D	Crossed Square		N42°11.503'	W87°47.285'	597	42.19171667	-87.78808333	a
56	HPB-11E	Crossed Square		N42°11.507'	W87°47.278'	610	42.19178333	-87.78796667	a
57	HPB-12A	Crossed Square	LINE 12-HGH WATER MARK	N42°11.490'	W87°47.289'	607	42.19150000	-87.78815000	a
58	HPB-12B	Crossed Square		N42°11.493'	W87°47.286'	591	42.19155000	-87.78810000	a
59	HPB-12C	Crossed Square		N42°11.496'	W87°47.281'	587	42.19160000	-87.78801667	a
60	HPB-12D	Crossed Square		N42°11.499'	W87°47.278'	587	42.19165000	-87.78796667	a
61	HPB-12E	Crossed Square		N42°11.501'	W87°47.271'	600	42.19168333	-87.78785000	a
62	HPBCH	Crossed Square	HPB SOUTHERN LIMIT	N42°11.490'	W87°47.283'	607	42.19150000	-87.78805000	a



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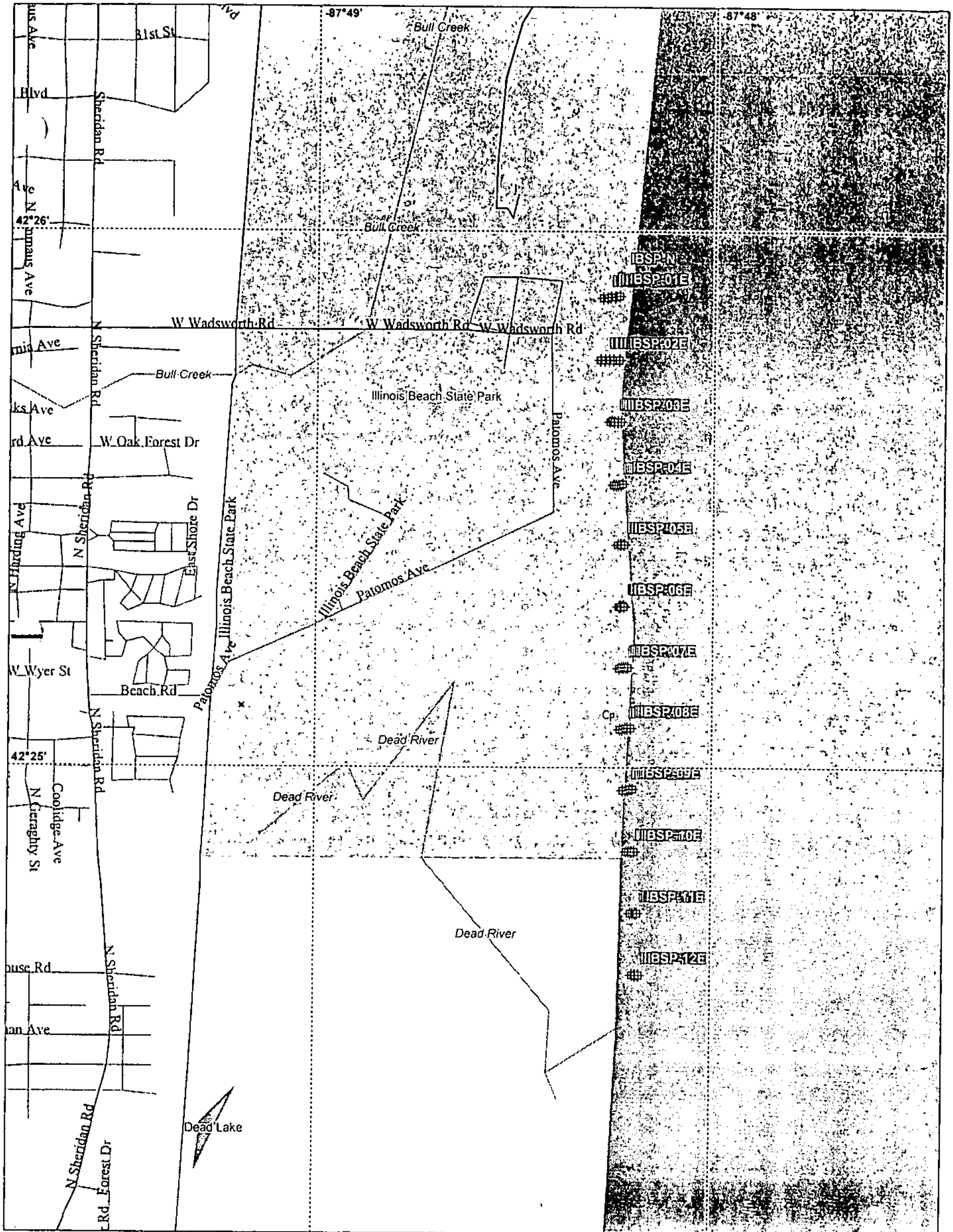

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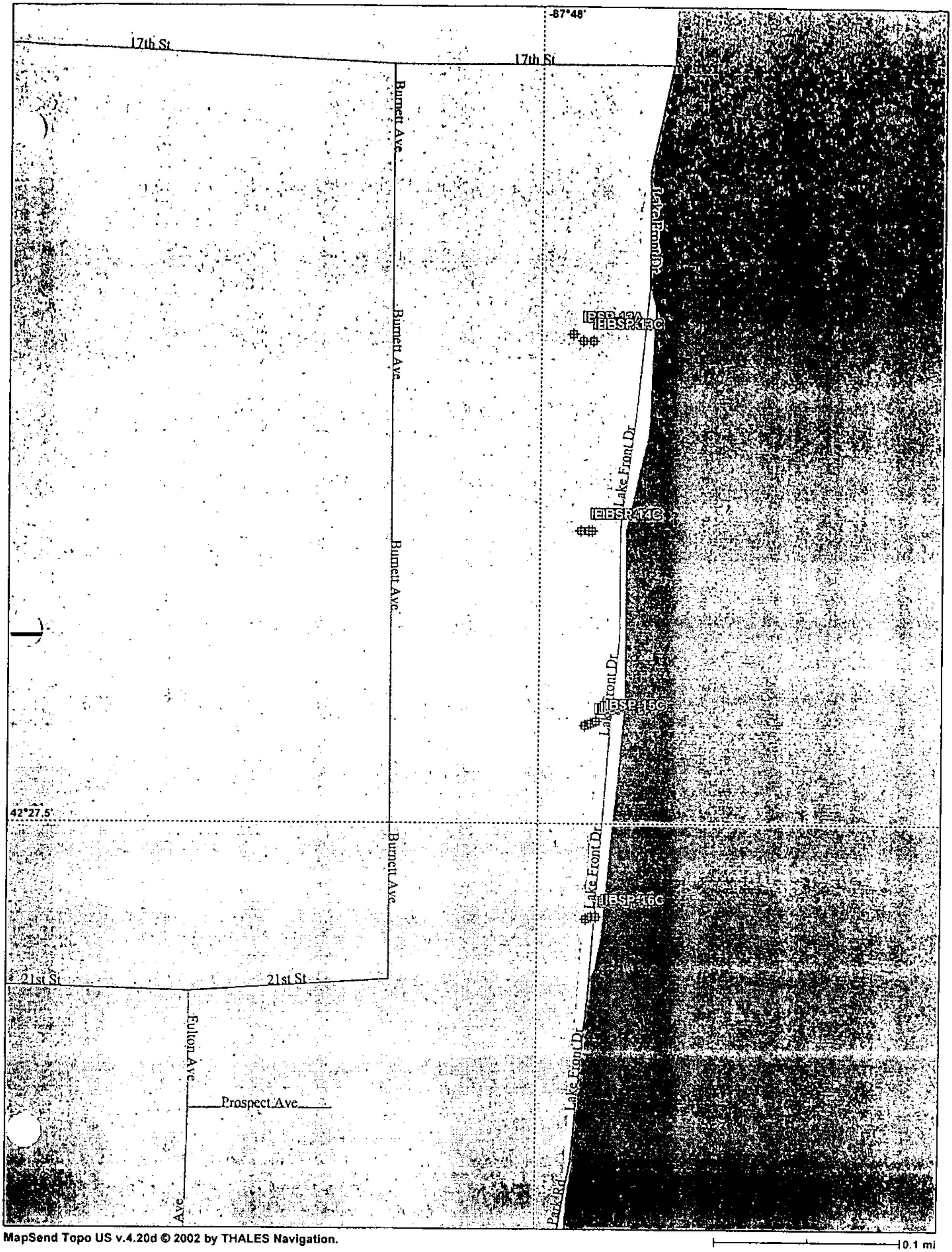

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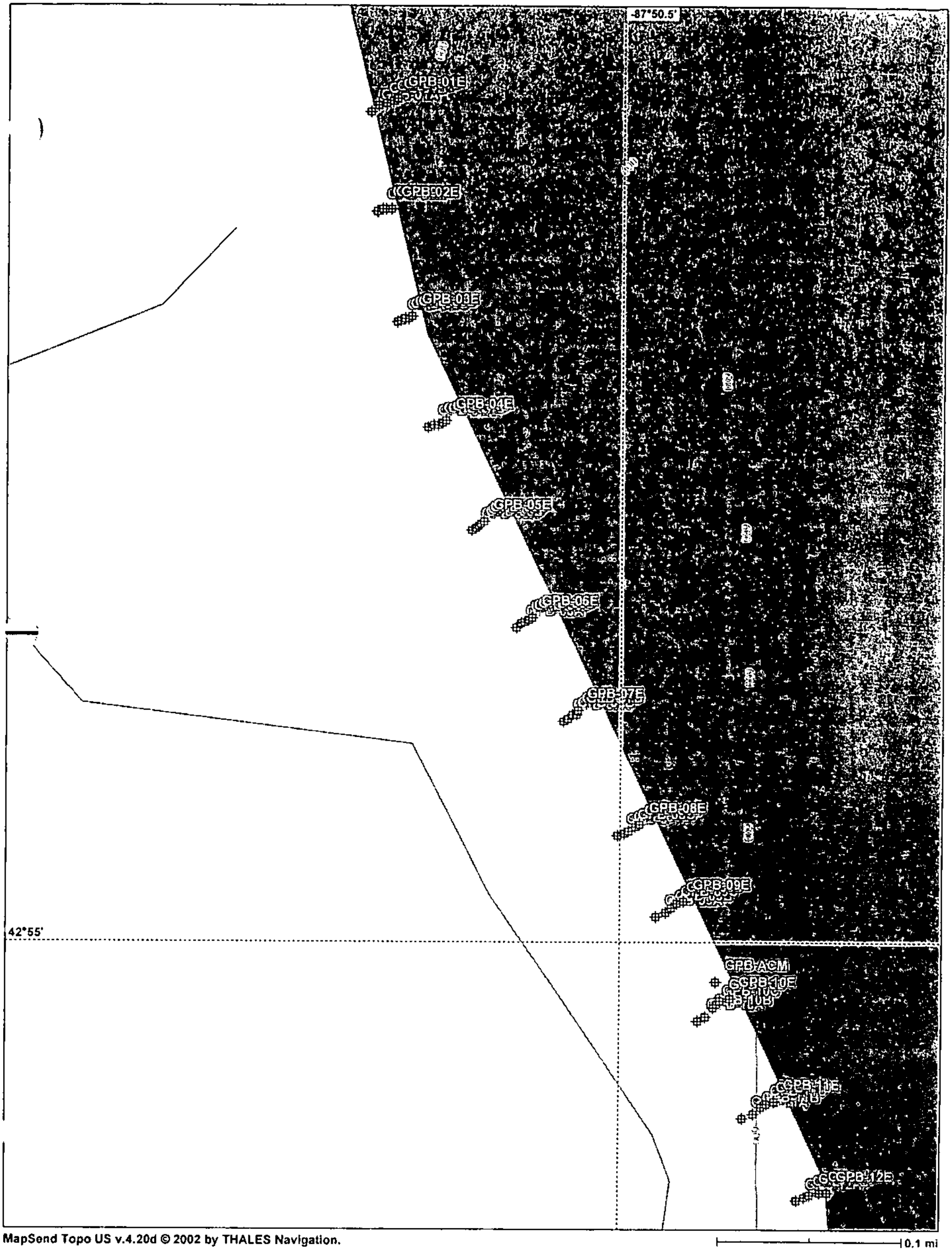
Illinois Beach State Park GPS Log from Beach Sand Sampling on July 6, 2004; CDB Project No. 102-311-707.

#	Name	Icon	Message	Latitude	Longitude	Altitude (ft)	Latitude (degrees)	Longitude (degrees)	Icon ID
1	IBSP-N	Crossed Square	NORTHERN BEACH LIMIT	N42°25.921'	W87°48.237'	561	42.43201667	-87.80395000	a
2	IBSP-01A	Crossed Square	HIGH WATER MARK - LINE 1 NORTH	N42°25.878'	W87°48.284'	587	42.43130000	-87.80473333	a
3	IBSP-01B	Crossed Square		N42°25.879'	W87°48.272'	594	42.43131667	-87.80453333	a
4	IBSP-01C	Crossed Square		N42°25.880'	W87°48.262'	597	42.43133333	-87.80436667	a
5	IBSP-01D	Crossed Square		N42°25.880'	W87°48.251'	597	42.43133333	-87.80418333	a
6	IBSP-01E	Crossed Square		N42°25.882'	W87°48.241'	597	42.43136667	-87.80401667	a
7	IBSP-02A	Crossed Square	HIGH WATER MARK LINE2	N42°25.764'	W87°48.289'	604	42.42940000	-87.80481667	a
8	IBSP-02B	Crossed Square		N42°25.765'	W87°48.276'	597	42.42941667	-87.80460000	a
9	IBSP-02C	Crossed Square		N42°25.764'	W87°48.265'	597	42.42940000	-87.80441667	a
10	IBSP-02D	Crossed Square		N42°25.764'	W87°48.254'	594	42.42940000	-87.80423333	a
11	IBSP-02E	Crossed Square	WATER LINE	N42°25.764'	W87°48.241'	591	42.42940000	-87.80401667	a
12	IBSP-03A	Crossed Square	HIGH WATER MARK LINE3	N42°25.649'	W87°48.263'	587	42.42748333	-87.80438333	a
13	IBSP-03B	Crossed Square		N42°25.650'	W87°48.257'	584	42.42750000	-87.80428333	a
14	IBSP-03C	Crossed Square		N42°25.649'	W87°48.251'	591	42.42748333	-87.80418333	a
15	IBSP-03D	Crossed Square		N42°25.648'	W87°48.244'	594	42.42746667	-87.80406667	a
16	IBSP-03E	Crossed Square	WATER LINE LINE3	N42°25.649'	W87°48.236'	587	42.42748333	-87.80393333	a
17	IBSP-04A	Crossed Square	HIGH WATER MARK LINE4	N42°25.531'	W87°48.253'	591	42.42551667	-87.80421667	a
18	IBSP-04B	Crossed Square		N42°25.530'	W87°48.247'	597	42.42550000	-87.80411667	a
19	IBSP-04C	Crossed Square		N42°25.530'	W87°48.241'	604	42.42550000	-87.80401667	a
20	IBSP-04D	Crossed Square		N42°25.531'	W87°48.235'	600	42.42551667	-87.80391667	a
21	IBSP-04E	Crossed Square	WATER LINE-LINE4	N42°25.532'	W87°48.230'	587	42.42553333	-87.80383333	a
22	IBSP-05A	Crossed Square	HIGH WATER MARK LINE5	N42°25.418'	W87°48.240'	587	42.42363333	-87.80400000	a
23	IBSP-05B	Crossed Square		N42°25.418'	W87°48.236'	584	42.42363333	-87.80393333	a
24	IBSP-05C	Crossed Square		N42°25.418'	W87°48.232'	587	42.42363333	-87.80386667	a
25	IBSP-05D	Crossed Square		N42°25.418'	W87°48.228'	584	42.42363333	-87.80380000	a
26	IBSP-05E	Crossed Square	WATER LINE - LINE5	N42°25.419'	W87°48.223'	584	42.42365000	-87.80371667	a
27	IBSP-06A	Crossed Square	HIGH WATER MARK LINE6	N42°25.303'	W87°48.239'	587	42.42171667	-87.80398333	a
28	IBSP-06B	Crossed Square		N42°25.303'	W87°48.236'	587	42.42171667	-87.80393333	a
29	IBSP-06C	Crossed Square		N42°25.303'	W87°48.232'	584	42.42171667	-87.80386667	a
30	IBSP-06D	Crossed Square		N42°25.304'	W87°48.228'	584	42.42173333	-87.80380000	a
31	IBSP-06E	Crossed Square	WATER LINE - LINE6	N42°25.303'	W87°48.223'	581	42.42171667	-87.80371667	a
32	IBSP-07A	Crossed Square	HIGH WATER MARK LINE7	N42°25.187'	W87°48.236'	584	42.41978333	-87.80393333	a
33	IBSP-07B	Crossed Square		N42°25.188'	W87°48.231'	584	42.41980000	-87.80385000	a
34	IBSP-07C	Crossed Square		N42°25.188'	W87°48.225'	587	42.41980000	-87.80375000	a
35	IBSP-07D	Crossed Square		N42°25.189'	W87°48.220'	584	42.41981667	-87.80366667	a
36	IBSP-07E	Crossed Square	WATER LINE - LINE7	N42°25.189'	W87°48.214'	584	42.41981667	-87.80356667	a
37	IBSP-08A	Crossed Square	HIGH WATER MARK LINE8	N42°25.073'	W87°48.232'	587	42.41788333	-87.80386667	a

38	IBSP-08B	Crossed Square		N42°25.073'	W87°48.226'	587	42.41788333	-87.80376667	a
39	IBSP-08C	Crossed Square		N42°25.074'	W87°48.219'	584	42.41790000	-87.80365000	a
40	IBSP-08D	Crossed Square		N42°25.074'	W87°48.212'	587	42.41790000	-87.80353333	a
41	IBSP-08E	Crossed Square	WATER LINE - LINE8	N42°25.074'	W87°48.205'	581	42.41790000	-87.80341667	a
42	IBSP-09A	Crossed Square	HIGH WATER MARK LINE9	N42°24.957'	W87°48.223'	594	42.41595000	-87.80371667	a
43	IBSP-09B	Crossed Square		N42°24.957'	W87°48.216'	581	42.41595000	-87.80360000	a
44	IBSP-09C	Crossed Square		N42°24.958'	W87°48.210'	584	42.41596667	-87.80350000	a
45	IBSP-09D	Crossed Square		N42°24.959'	W87°48.204'	587	42.41598333	-87.80340000	a
46	IBSP-09E	Crossed Square	WATER LINE - LINE9	N42°24.959'	W87°48.198'	584	42.41598333	-87.80330000	a
47	IBSP-10A	Crossed Square	HIGH WATER MARK LINE 10	N42°24.844'	W87°48.213'	591	42.41406667	-87.80355000	a
48	IBSP-10B	Crossed Square		N42°24.844'	W87°48.207'	591	42.41406667	-87.80345000	a
49	IBSP-10C	Crossed Square		N42°24.844'	W87°48.202'	591	42.41406667	-87.80336667	a
50	IBSP-10D	Crossed Square		N42°24.844'	W87°48.198'	584	42.41406667	-87.80330000	a
51	IBSP-10E	Crossed Square	WATER LINE - LINE 10	N42°24.845'	W87°48.193'	587	42.41408333	-87.80321667	a
52	IBSP-11A	Crossed Square	HIGH WATER MARK LINE 11	N42°24.729'	W87°48.202'	584	42.41215000	-87.80336667	a
53	IBSP-11B	Crossed Square		N42°24.729'	W87°48.197'	591	42.41215000	-87.80328333	a
54	IBSP-11C	Crossed Square		N42°24.729'	W87°48.192'	587	42.41215000	-87.80320000	a
55	IBSP-11D	Crossed Square		N42°24.729'	W87°48.189'	584	42.41215000	-87.80315000	a
56	IBSP-11E	Crossed Square	WATER LINE - LINE 11	N42°24.730'	W87°48.184'	584	42.41216667	-87.80306667	a
57	IBSP-12A	Crossed Square	HIGH WATER MARK LINE 12	N42°24.615'	W87°48.196'	587	42.41025000	-87.80326667	a
58	IBSP-12B	Crossed Square		N42°24.616'	W87°48.192'	584	42.41026667	-87.80320000	a
59	IBSP-12C	Crossed Square		N42°24.616'	W87°48.188'	587	42.41026667	-87.80313333	a
60	IBSP-12D	Crossed Square		N42°24.616'	W87°48.183'	584	42.41026667	-87.80305000	a
61	IBSP-12E	Crossed Square	WATER LINE - LINE 12	N42°24.617'	W87°48.179'	584	42.41028333	-87.80298333	a
62	IBSP-13A	Crossed Square	NORTH LIMIT - LINE 13 HWM	N42°27.730'	W87°47.980'	568	42.46216667	-87.79966667	a
63	IBSP-13B	Crossed Square		N42°27.727'	W87°47.973'	581	42.46211667	-87.79955000	a
64	IBSP-13C	Crossed Square	WATER LINE - LINE 13	N42°27.727'	W87°47.967'	581	42.46211667	-87.79945000	a
65	IBSP-14A	Crossed Square	HIGH WATER MARK LINE 14	N42°27.638'	W87°47.969'	584	42.46063333	-87.79948333	a
66	IBSP-14B	Crossed Square		N42°27.638'	W87°47.974'	584	42.46063333	-87.79956667	a
67	IBSP-14C	Crossed Square	WATER LINE - LINE 14	N42°27.638'	W87°47.967'	581	42.46063333	-87.79945000	a
68	IBSP-15A	Crossed Square	HIGH WATER MARK LINE 15	N42°27.546'	W87°47.971'	594	42.45910000	-87.79951667	a
69	IBSP-15B	Crossed Square		N42°27.547'	W87°47.967'	584	42.45911667	-87.79945000	a
70	IBSP-15C	Crossed Square	WATER LINE - LINE 15	N42°27.548'	W87°47.964'	581	42.45913333	-87.79940000	a
71	IBSP-16A	Crossed Square	HIGH WATER MARK - LINE 16	N42°27.456'	W87°47.969'	581	42.45760000	-87.79948333	a
72	IBSP-16B	Crossed Square		N42°27.457'	W87°47.966'	591	42.45761667	-87.79943333	a
73	IBSP-16C	Crossed Square	WATER LINE - LINE 16	N42°27.457'	W87°47.963'	591	42.45761667	-87.79938333	a



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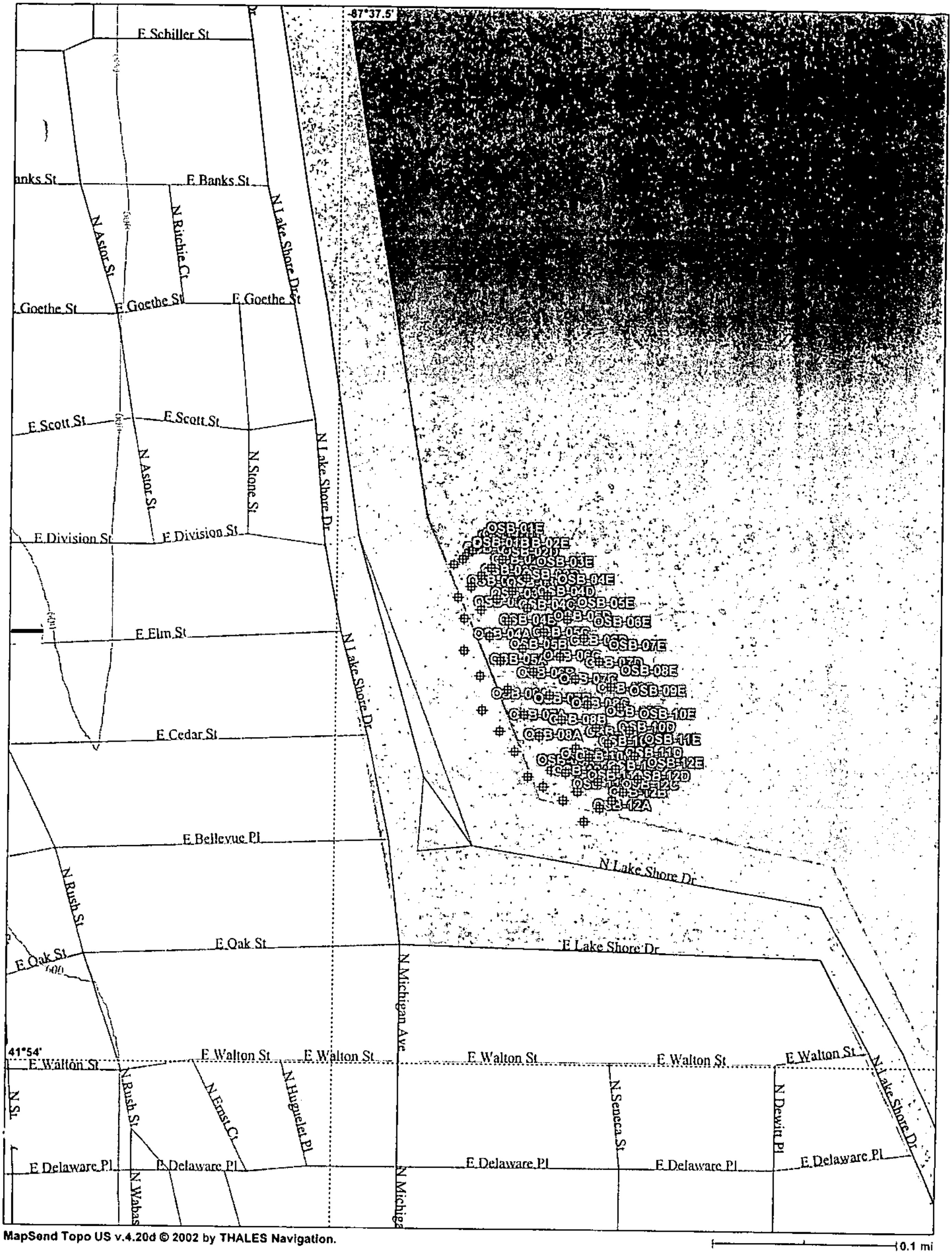
Grant Park Beach, S. Milwaukee GPS Log from Beach Sand Sampling on July 8, 2004; CDB Project No. 102-311-707.

#	Name	Icon	Message	Latitude	Longitude	Altitude (ft)	Latitude (degrees)	Longitude (degrees)	Icon ID
1	GPB-01A	Crossed Square	HIGH WATER MARK - LINE 1	N42°55.387'	W87°50.662'	564	42.92311667	-87.84436667	a
2	GPB-01B	Crossed Square		N42°55.390'	W87°50.657'	574	42.92316667	-87.84428333	a
3	GPB-01C	Crossed Square		N42°55.391'	W87°50.652'	574	42.92318333	-87.84420000	a
4	GPB-01D	Crossed Square		N42°55.392'	W87°50.648'	577	42.92320000	-87.84413333	a
5	GPB-01E	Crossed Square	WATER LINE - LINE 1	N42°55.393'	W87°50.645'	577	42.92321667	-87.84408333	a
6	GPB-02B	Crossed Square		N42°55.341'	W87°50.657'	587	42.92235000	-87.84428333	a
7	GPB-02A	Crossed Square	HIGH WATER MARK - LINE 2	N42°55.341'	W87°50.658'	587	42.92235000	-87.84430000	a
8	GPB-02C	Crossed Square		N42°55.342'	W87°50.654'	587	42.92236667	-87.84423333	a
9	GPB-02D	Crossed Square		N42°55.342'	W87°50.652'	584	42.92236667	-87.84420000	a
10	GPB-02E	Crossed Square	WATER LINE - LINE 2	N42°55.342'	W87°50.649'	584	42.92236667	-87.84415000	a
11	GPB-03A	Crossed Square	HIGH WATER MARK - LINE 3	N42°55.290'	W87°50.644'	591	42.92150000	-87.84406667	a
12	GPB-03B	Crossed Square		N42°55.291'	W87°50.642'	587	42.92151667	-87.84403333	a
13	GPB-03C	Crossed Square		N42°55.292'	W87°50.639'	587	42.92153333	-87.84398333	a
14	GPB-03D	Crossed Square		N42°55.292'	W87°50.637'	587	42.92153333	-87.84395000	a
15	GPB-03E	Crossed Square	WATER LINE - LINE 3	N42°55.293'	W87°50.635'	587	42.92155000	-87.84391667	a
16	GPB-04A	Crossed Square	HIGH WATER MARK - LINE 4	N42°55.241'	W87°50.624'	587	42.92068333	-87.84373333	a
17	GPB-04B	Crossed Square		N42°55.242'	W87°50.621'	591	42.92070000	-87.84368333	a
18	GPB-04C	Crossed Square		N42°55.242'	W87°50.618'	584	42.92070000	-87.84363333	a
19	GPB-04D	Crossed Square		N42°55.243'	W87°50.615'	584	42.92071667	-87.84358333	a
20	GPB-04E	Crossed Square	WATER LINE - LINE 4	N42°55.244'	W87°50.613'	577	42.92073333	-87.84355000	a
21	GPB-05A	Crossed Square	HIGH WATER MARK LINE 5	N42°55.193'	W87°50.596'	587	42.91988333	-87.84326667	a
22	GPB-05B	Crossed Square		N42°55.194'	W87°50.593'	587	42.91990000	-87.84321667	a
23	GPB-05C	Crossed Square		N42°55.195'	W87°50.592'	584	42.91991667	-87.84320000	a
24	GPB-05D	Crossed Square		N42°55.196'	W87°50.590'	584	42.91993333	-87.84316667	a
25	GPB-05E	Crossed Square	WATER LINE - LINE 5	N42°55.197'	W87°50.588'	581	42.91995000	-87.84313333	a
26	GPB-06A	Crossed Square	HIGH WATER MARK - LINE 6	N42°55.147'	W87°50.567'	594	42.91911667	-87.84278333	a
27	GPB-06B	Crossed Square		N42°55.149'	W87°50.564'	591	42.91915000	-87.84273333	a
28	GPB-06C	Crossed Square		N42°55.150'	W87°50.562'	584	42.91916667	-87.84270000	a
29	GPB-06D	Crossed Square		N42°55.151'	W87°50.559'	584	42.91918333	-87.84265000	a
30	GPB-06E	Crossed Square	WATER LINE - LINE 6	N42°55.152'	W87°50.557'	581	42.91920000	-87.84261667	a
31	GPB-07A	Crossed Square	HIGH WATER MARK - LINE 7	N42°55.103'	W87°50.536'	584	42.91838333	-87.84226667	a
32	GPB-07B	Crossed Square		N42°55.104'	W87°50.534'	584	42.91840000	-87.84223333	a
33	GPB-07C	Crossed Square		N42°55.106'	W87°50.531'	584	42.91843333	-87.84218333	a
34	GPB-07D	Crossed Square		N42°55.106'	W87°50.528'	584	42.91843333	-87.84213333	a
35	GPB-07E	Crossed Square	WATER LINE - LINE 7	N42°55.108'	W87°50.527'	574	42.91846667	-87.84211667	a
36	GPB-08A	Crossed Square	HIGH WATER MARK - LINE 8	N42°55.050'	W87°50.501'	594	42.91750000	-87.84168333	a
37	GPB-08B	Crossed Square		N42°55.051'	W87°50.497'	591	42.91751667	-87.84161667	a

38	GPB-08C	Crossed Square		N42°55.052'	W87°50.494'	591	42.91753333	-87.84156667	a
39	GPB-08D	Crossed Square		N42°55.054'	W87°50.490'	587	42.91756667	-87.84150000	a
40	GPB-08E	Crossed Square	WATER LINE - LINE 8	N42°55.055'	W87°50.487'	581	42.91758333	-87.84145000	a
41	GPB-09A	Crossed Square	HIGH WATER MARK - LINE 9	N42°55.012'	W87°50.476'	584	42.91686667	-87.84126667	a
42	GPB-09B	Crossed Square		N42°55.014'	W87°50.470'	591	42.91690000	-87.84116667	a
43	GPB-09C	Crossed Square		N42°55.016'	W87°50.466'	591	42.91693333	-87.84110000	a
44	GPB-09D	Crossed Square		N42°55.018'	W87°50.463'	591	42.91696667	-87.84105000	a
45	GPB-09E	Crossed Square	WATER LINE - LINE 9	N42°55.019'	W87°50.459'	584	42.91698333	-87.84098333	a
46	GPB-ACM	Crossed Square	TRANSITE DEBRIS AT WATER LINE	N42°54.982'	W87°50.438'	571	42.91636667	-87.84063333	a
47	GPB-10A	Crossed Square	HIGH WATER MARK - LINE 10	N42°54.964'	W87°50.449'	581	42.91606667	-87.84081667	a
48	GPB-10B	Crossed Square		N42°54.966'	W87°50.444'	581	42.91610000	-87.84073333	a
49	GPB-10C	Crossed Square		N42°54.970'	W87°50.439'	591	42.91616667	-87.84065000	a
50	GPB-10D	Crossed Square		N42°54.973'	W87°50.435'	591	42.91621667	-87.84058333	a
51	GPB-10E	Crossed Square	WATER LINE - LINE 10	N42°54.974'	W87°50.429'	574	42.91623333	-87.84048333	a
52	GPB-11A	Crossed Square	HIGH WATER MARK - LINE 11	N42°54.919'	W87°50.420'	591	42.91531667	-87.84033333	a
53	GPB-11B	Crossed Square		N42°54.921'	W87°50.413'	587	42.91535000	-87.84021667	a
54	GPB-11C	Crossed Square		N42°54.924'	W87°50.408'	584	42.91540000	-87.84013333	a
55	GPB-11D	Crossed Square		N42°54.926'	W87°50.405'	581	42.91543333	-87.84008333	a
56	GPB-11E	Crossed Square	WATER LINE - LINE 11	N42°54.927'	W87°50.400'	577	42.91545000	-87.84000000	a
57	GPB-12A	Crossed Square	HIGH WATER MARK - LINE 12	N42°54.881'	W87°50.385'	584	42.91468333	-87.83975000	a
58	GPB-12B	Crossed Square		N42°54.883'	W87°50.380'	577	42.91471667	-87.83966667	a
59	GPB-12C	Crossed Square		N42°54.884'	W87°50.376'	571	42.91473333	-87.83960000	a
60	GPB-12D	Crossed Square		N42°54.885'	W87°50.370'	571	42.91475000	-87.83950000	a
61	GPB-12E	Crossed Square	WATER LINE - LINE 12	N42°54.885'	W87°50.365'	571	42.91475000	-87.83941667	a

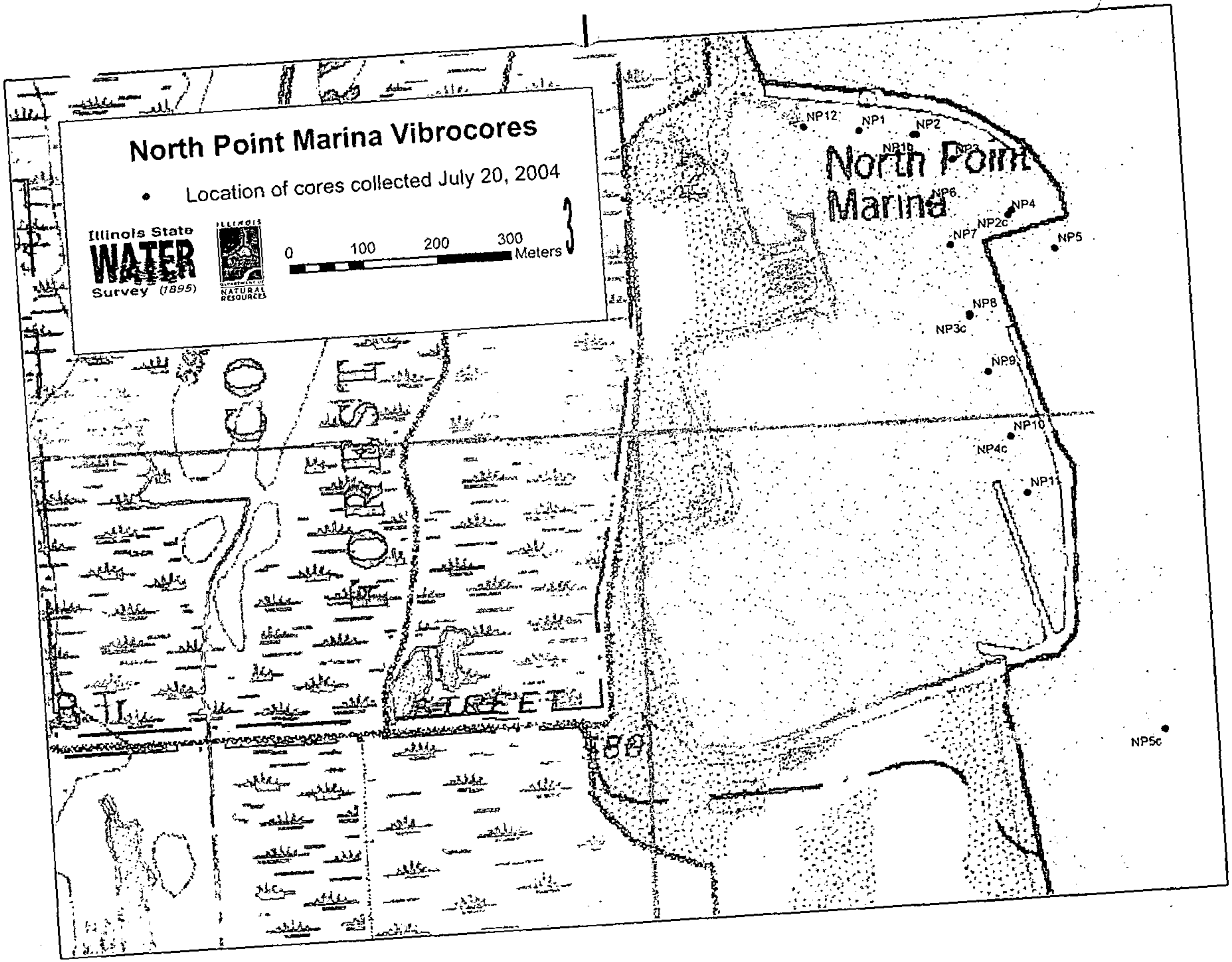


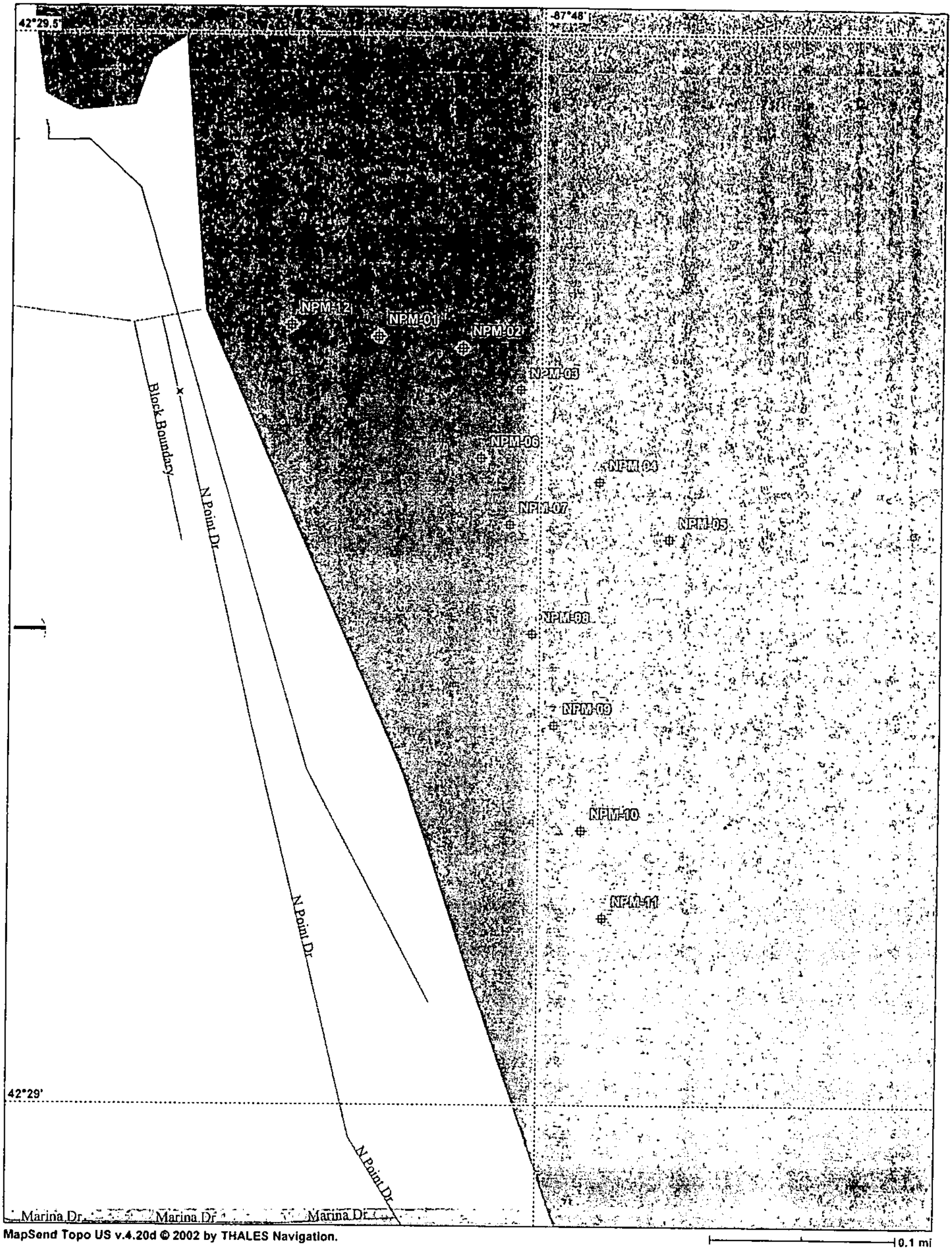
MapSend Topo US v.4.20d © 2002 by THALES Navigation.

Oak Street Beach GPS Log from Beach Sand Sampling on July 14, 2004; CDB Project No. 102-311-707.

#	Name	Icon	Message	Latitude	Longitude	Altitude (ft)	Latitude (degrees)	Longitude (degrees)	Icon ID
1	OSB-01A	Crossed Square	HIGH WATER MARK - LINE 1	N41°54.233'	W87°37.426'	630	41.90388333	-87.62376667	a
2	OSB-01B	Crossed Square		N41°54.236'	W87°37.421'	614	41.90393333	-87.62368333	a
3	OSB-01C	Crossed Square		N41°54.239'	W87°37.417'	600	41.90398333	-87.62361667	a
4	OSB-01D	Crossed Square		N41°54.240'	W87°37.414'	591	41.90400000	-87.62356667	a
5	OSB-01E	Crossed Square	WATER LINE - LINE 1	N41°54.243'	W87°37.411'	591	41.90405000	-87.62351667	a
6	OSB-02A	Crossed Square	HIGH WATER MARK - LINE 2	N41°54.218'	W87°37.423'	627	41.90363333	-87.62371667	a
7	OSB-02B	Crossed Square		N41°54.223'	W87°37.415'	600	41.90371667	-87.62358333	a
8	OSB-02C	Crossed Square		N41°54.228'	W87°37.409'	597	41.90380000	-87.62348333	a
9	OSB-02D	Crossed Square		N41°54.232'	W87°37.402'	594	41.90386667	-87.62336667	a
10	OSB-02E	Crossed Square	WATER LINE - LINE 2	N41°54.236'	W87°37.395'	591	41.90393333	-87.62325000	a
11	OSB-03A	Crossed Square	HIGH WATER MARK - LINE 3	N41°54.208'	W87°37.419'	610	41.90346667	-87.62365000	a
12	OSB-03B	Crossed Square		N41°54.212'	W87°37.409'	597	41.90353333	-87.62348333	a
13	OSB-03C	Crossed Square		N41°54.217'	W87°37.399'	584	41.90361667	-87.62331667	a
14	OSB-03D	Crossed Square		N41°54.221'	W87°37.389'	584	41.90368333	-87.62315000	a
15	OSB-03E	Crossed Square	WATER LINE - LINE 3	N41°54.227'	W87°37.380'	587	41.90378333	-87.62300000	a
16	OSB-04A	Crossed Square	HIGH WATER MARK - LINE 4	N41°54.193'	W87°37.419'	646	41.90321667	-87.62365000	a
17	OSB-04B	Crossed Square		N41°54.200'	W87°37.403'	607	41.90333333	-87.62338333	a
18	OSB-04C	Crossed Square		N41°54.207'	W87°37.391'	600	41.90345000	-87.62318333	a
18	OSB-04D	Crossed Square		N41°54.213'	W87°37.379'	594	41.90355000	-87.62298333	a
20	OSB-04E	Crossed Square	WATER LINE - LINE 4	N41°54.219'	W87°37.367'	591	41.90365000	-87.62278333	a
21	OSB-05A	Crossed Square	HIGH WATER MARK - LINE 5	N41°54.181'	W87°37.409'	600	41.90301667	-87.62348333	a
22	OSB-05B	Crossed Square		N41°54.188'	W87°37.396'	591	41.90313333	-87.62326667	a
23	OSB-05C	Crossed Square		N41°54.194'	W87°37.382'	587	41.90323333	-87.62303333	a
24	OSB-05D	Crossed Square		N41°54.202'	W87°37.369'	581	41.90336667	-87.62281667	a
25	OSB-05E	Crossed Square	WATER LINE - LINE 5	N41°54.208'	W87°37.354'	584	41.90346667	-87.62256667	a
26	OSB-06A	Crossed Square	HIGH WATER MARK - LINE 6	N41°54.165'	W87°37.407'	610	41.90275000	-87.62345000	a
27	OSB-06B	Crossed Square		N41°54.175'	W87°37.391'	607	41.90291667	-87.62318333	a
28	OSB-06C	Crossed Square		N41°54.183'	W87°37.375'	594	41.90305000	-87.62291667	a
29	OSB-06D	Crossed Square		N41°54.190'	W87°37.358'	587	41.90316667	-87.62263333	a
30	OSB-06E	Crossed Square	WATER LINE - LINE 6	N41°54.199'	W87°37.344'	584	41.90331667	-87.62240000	a
31	OSB-07A	Crossed Square	HIGH WATER MARK - LINE 7	N41°54.155'	W87°37.396'	610	41.90258333	-87.62326667	a
32	OSB-07B	Crossed Square		N41°54.163'	W87°37.381'	591	41.90271667	-87.62301667	a
33	OSB-07C	Crossed Square		N41°54.172'	W87°37.365'	587	41.90286667	-87.62275000	a
34	OSB-07D	Crossed Square		N41°54.180'	W87°37.349'	584	41.90300000	-87.62248333	a
35	OSB-07E	Crossed Square	WATER LINE - LINE 7	N41°54.188'	W87°37.334'	571	41.90313333	-87.62223333	a
36	OSB-08A	Crossed Square	HIGH WATER MARK - LINE 8	N41°54.146'	W87°37.386'	597	41.90243333	-87.62310000	a

37	OSB-08B	Crossed Square		N41°54.153'	W87°37.371'	594	41.90255000	-87.62285000	a
38	OSB-08C	Crossed Square		N41°54.161'	W87°37.357'	591	41.90268333	-87.62261667	a
39	OSB-08D	Crossed Square		N41°54.168'	W87°37.341'	591	41.90280000	-87.62235000	a
40	OSB-08E	Crossed Square	WATER LINE - LINE 8	N41°54.176'	W87°37.326'	587	41.90293333	-87.62210000	a
41	OSB-09A	Crossed Square	HIGH WATER MARK - LINE 9	N41°54.134'	W87°37.378'	614	41.90223333	-87.62296667	a
42	OSB-09B	Crossed Square		N41°54.137'	W87°37.363'	630	41.90228333	-87.62271667	a
43	OSB-09C	Crossed Square		N41°54.147'	W87°37.348'	617	41.90245000	-87.62246667	a
44	OSB-09D	Crossed Square		N41°54.157'	W87°37.335'	604	41.90261667	-87.62225000	a
45	OSB-09E	Crossed Square	WATER LINE - LINE 9	N41°54.167'	W87°37.321'	581	41.90278333	-87.62201667	a
46	OSB-10A	Crossed Square	HIGH WATER MARK - LINE 10	N41°54.129'	W87°37.368'	597	41.90215000	-87.62280000	a
47	OSB-10B	Crossed Square		N41°54.136'	W87°37.354'	600	41.90226667	-87.62256667	a
48	OSB-10C	Crossed Square		N41°54.143'	W87°37.340'	594	41.90238333	-87.62233333	a
49	OSB-10D	Crossed Square		N41°54.150'	W87°37.328'	587	41.90250000	-87.62213333	a
50	OSB-10E	Crossed Square	WATER LINE LINE 10	N41°54.156'	W87°37.314'	584	41.90260000	-87.62190000	a
51	OSB-11A	Crossed Square	HIGH WATER MARK - LINE 11	N41°54.123'	W87°37.356'	587	41.90205000	-87.62260000	a
52	OSB-11B	Crossed Square		N41°54.127'	W87°37.346'	604	41.90211667	-87.62243333	a
53	OSB-11C	Crossed Square		N41°54.132'	W87°37.334'	610	41.90220000	-87.62223333	a
54	OSB-11D	Crossed Square		N41°54.138'	W87°37.323'	594	41.90230000	-87.62205000	a
55	OSB-11E	Crossed Square	WATER LINE - LINE 11	N41°54.144'	W87°37.311'	587	41.90240000	-87.62185000	a
56	OSB-12A	Crossed Square	HIGH WATER MARK - LINE 12	N41°54.113'	W87°37.342'	607	41.90188333	-87.62236667	a
57	OSB-12B	Crossed Square		N41°54.119'	W87°37.333'	640	41.90198333	-87.62221667	a
58	OSB-12C	Crossed Square		N41°54.123'	W87°37.325'	627	41.90205000	-87.62208333	a
59	OSB-12D	Crossed Square		N41°54.127'	W87°37.318'	584	41.90211667	-87.62196667	a
60	OSB-12E	Crossed Square	WATER LINE - LINE 12	N41°54.133'	W87°37.309'	584	41.90221667	-87.62181667	a


North Point Marina Vibrocores
Location of cores collected July 20, 2004
Illinois State
WATER
Survey (1895)
ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES
0
100
200
300
Meters
North Point
Marina
NP12
NP1
NP2
NP1b
NP3
NP6
NP4
NP2c
NP7
NP5
NP8
NP3c
NP9
NP10
NP4c
NP11
NP5c
STREET



MapSend Topo US v.4.20d © 2002 by THALES Navigation.

North Point Marina GPS Log of Lake Sediment Samples Collected on July 21 & 22, 2004; CDB Project No. 102-311-707.
Vibra Core Sampling Performed by the Illinois State Water Survey & Samples prepared in the ISWS Lab in Peoria, IL.

#	Name	Icon	Message	Latitude	Longitude	Altitude (ft)	Latitude (degrees)	Longitude (degrees)	Icon ID
1	NPM-01	Crossed Square		N42°29.360'	W87°48.103'	0	42.48933333	-87.80171667	a
2	NPM-03	Crossed Square		N42°29.335'	W87°48.016'	0	42.48891667	-87.80026667	a
3	NPM-02	Crossed Square		N42°29.355'	W87°48.050'	0	42.48925000	-87.80083333	a
4	NPM-04	Crossed Square		N42°29.292'	W87°47.962'	0	42.48820000	-87.79936667	a
5	NPM-05	Crossed Square		N42°29.265'	W87°47.918'	0	42.48775000	-87.79863333	a
6	NPM-06	Crossed Square		N42°29.303'	W87°48.038'	0	42.48838333	-87.80063333	a
7	NPM-07	Crossed Square		N42°29.272'	W87°48.020'	0	42.48786667	-87.80033333	a
8	NPM-08	Crossed Square		N42°29.220'	W87°48.005'	0	42.48700000	-87.80008333	a
9	NPM-09	Crossed Square		N42°29.177'	W87°47.990'	0	42.48628333	-87.79983333	a
10	NPM-10	Crossed Square		N42°29.128'	W87°47.972'	0	42.48546667	-87.79953333	a
11	NPM-11	Crossed Square		N42°29.087'	W87°47.958'	0	42.48478333	-87.79930000	a
12	NPM-12	Crossed Square		N42°29.365'	W87°48.158'	0	42.48941667	-87.80263333	a

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

NP1
Core # 175
Collected July 22, 2004
bagged NPM-01 a-e
pictures NP1 a-c
Core Length: 4.5 ft

segment (ft)	description
0.0-0.3	Dark gray sand-silt mix, shading to dark brown sand-silt mix. Some organic content—sewage odor. Shell fragments throughout.
0.3-1.8	Dark brown sand, banded with gray silt. Shell fragments throughout.
1.8-4.5	Dark brown sand. Some gravel present, shell fragments throughout. Large stone, somewhat smoothed, >1" diameter.

NP1C
Core # 174
Collected July 22, 2004
bagged NPM-01C a-e
pictures NP1C a-c
Core Length: 4.4 ft

segment (ft)	description
0.0-0.8	Dark gray sand-silt-clay mix. Organic content—sewage odor, some woody material. Some gravel present, shell fragments throughout.
0.8-1.6	Dark brown sand, shell fragments throughout.
1.6-1.8	Dark brown sand. Gravel present, including several well-rounded stones, one >1", shell fragments throughout.
1.8-4.4	Dark brown sand, some gravel present, shell fragments throughout.

NP2
Core # 173
Collected July 22, 2004
bagged NPM-02 a-c
pictures NP2 a-c
Core Length: 4.3 ft

segment (ft)	description
0.0-1.5	Dark gray sand-silt-clay mix. Organic content—sewage odor. Shell fragments throughout.
1.5-2.3	Dark brown sand. Gravel present including several well-rounded stones, shell fragments throughout.
2.3-4.3	Brown sand. Shell fragments throughout. Washout at bottom of core.

NP2C
Core # 171
Collected July 22, 2004
bagged NPM-02C a-e
pictures NP2C a-c
Core Length: 4.6 ft

segment (ft)	description
0.0-1.4	Dark brown sand, some silt—especially around 0.8 to 1.0 ft mark. Some gravel present, shell fragments throughout.
1.4-1.7	Dark brown coarse sand, gravel. Well-smoothed stone, @ 2.5" long and 1.5" across, shell fragments throughout.
1.7-4.6	Dark brown sand. Shell fragments throughout.

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

NP3
Core # 172
Collected July 22, 2004
bagged NPM-03 a-e
pictures NP3 a-c
Core Length: 4.2 ft

segment (ft)	description
0.0-2.4	Dark gray sand-silt mix. Shell fragments throughout.
2.4-3.2	Coarse sand and gravel with several large stones, one @2" long and 1.5" across, others >1", shell fragments throughout.
3.2-4.2	Dark brown sand, some silt. Several large, smooth stones > 1" across, shell fragments throughout.

NP3C
Core # 180
Collected July 22, 2004
bagged NPM-03C a-e
pictures NP3C a-d
Core Length: 4.7 ft

segment (ft)	description
0.0-1.7	Dark brown sand, some silt. Some gravel present, shell fragments throughout.
1.7-1.9	Dark brown coarse sand and gravel. Some well-rounded stones, shell fragments throughout.
1.9-4.7	Dark brown sand, some silt. Shell fragments throughout.

NP4
Core # 170
Collected July 21, 2004
bagged NPM-04 a-e
pictures NP4 a-d
Core Length: 4.4 ft

segment (ft)	description
0.0-0.9	Dark brown sand, some silt. Woody material present, some gravel, shell fragments throughout.
0.9-1.1	Coarse sand, silt around outer edge. Shell fragments throughout.
1.1-1.6	Dark brown sand, some silt. Organic material—slight petroleum odor. Some gravel present, shell fragments throughout.
1.6-4.4	Dark brown sand, some silt. Shell fragments throughout. Large stone at 1.9 ft, @3" long and 1.5" across. Washout at bottom of core.

NP4C
Core # 183
Collected July 22, 2004
bagged NPM-04 a-e
pictures NP4C a-b
Core Length: 3.4 ft

segment (ft)	description
0.0-1.0	Dark gray sand-silt-clay mix shading towards dark brown sand. Organic content—faint petroleum odor.
1.0-2.4	Dark brown sand, some silt. Some gravel present, shell fragments throughout.
2.4-2.7	Dark brown coarse sand and gravel. Shell fragments throughout.
2.7-3.4	Dark brown sand, some silt, changing to light brown sand around 3.0 ft. Shell fragments throughout.

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

NP5
Core # 169
Collected July 21, 2004
bagged NPM-05 a-e
pictures NP5 a-d
Core length: 4.4 ft

segment (ft)	description
0.0-1.0	Dark brown sand. Some gravel present, shell fragments throughout.
1.0-1.2	Dark brown sand, some silt. Several large stones, first @ 3.5" long and 2" across, others >1". Shell fragments throughout.
1.2-1.6	Dark brown sand-clay mix. Shell fragments throughout.
1.6-2.6	Brown sand. Shell fragments throughout.
2.6-4.4	Dark brown sand, some silt. Shell fragments throughout.

NP5C
Core # 168
Collected July 21, 2004
bagged NPM-05C a-e
pictures NP5C a-b
Core Length: 3.0 ft

segment (ft)	description
0.0-0.9	Dark brown sand, shell fragments throughout.
0.9-1.2	Coarse sand, followed by a band of silt. Shell fragments throughout.
1.2-1.4	Dark brown sand. Shell fragments throughout.
1.4-1.5	Coarse sand, followed by a band of silt. Shell fragments throughout.
1.5-3.0	Dark brown sand. Shell fragments throughout.

NP6
Core # 177
Collected July 22, 2004
bagged NPM-06-a-e
pictures NP6 a-c
Core Length: 5.7 ft

segment (ft)	description
0.0-2.0	Dark gray sand-silt mix, shading to dark brown sand with some silt. Organic material—sewage odor. Some gravel present, shell fragments throughout.
2.0-5.7	Brown sand, some silt. Some gravel present, shell fragments throughout.

NP7
Core # 178
Collected July 22, 2004
bagged NPM-07 a-e
pictures NP7 a-e
Core Length: 5.2 ft

segment (ft)	description
0.0-3.0	Dark brown sand, some silt. Woody material present, some gravel, shell fragments throughout.
3.0-3.4	Light brown sand. Some gravel present, shell fragments throughout.
3.4-5.2	Brown sand, some silt. Shell fragments throughout. Washout at bottom of core.

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

NP8
Core # 179
Collected July 22, 2004
bagged NPM-08 a-e
pictures NP8 a-d
Core Length: 4.5 ft

segment (ft)	description
0.0-2.2	Dark brown sand-silt mix. Some gravel present, shell fragments throughout.
2.2-2.3	Coarse sand and gravel. Shell fragments throughout.
2.3-4.5	Light brown sand, some silt. Shell fragments throughout.

NP9
Core # 181
Collected July 22, 2004
bagged NPM-09 a-e
pictures NP9 a-d
Core Length: 4.2 ft

segment (ft)	description
0.0-1.0	Dark brown coarse sand, some silt. Gravel with large stones, including one @2" long and 1.8" across, shell fragments throughout.
1.0-1.8	Dark brown coarse sand. Some gravel present, shell fragments throughout.
1.8-4.2	Dark brown sand with some silt. Some gravel present, shell fragments throughout.

NP10
Core # 182
Collected July 22, 2004
bagged NPM-10 a-e
pictures NP10 a-d
Core Length: 3.8 ft

segment (ft)	description
0.0-1.3	Dark gray sand-silt clay mix. Organic material—sewage odor, woody material present. Shell fragments throughout.
1.3-3.8	Dark brown sand. Some gravel present, shell fragments throughout.

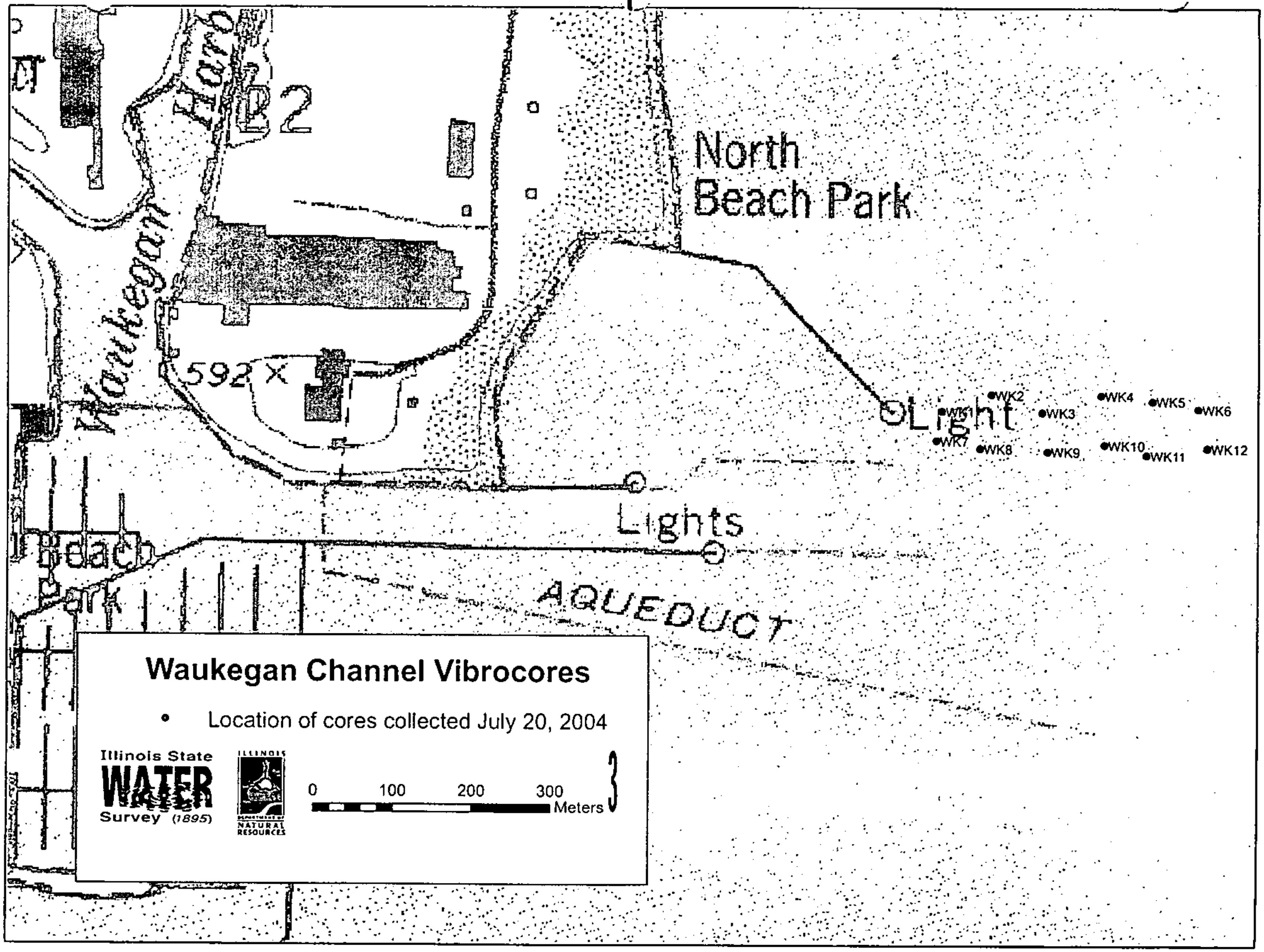
NP11
Core # 184
Collected July 22, 2004
bagged NPM-11 a-e
pictures NP11 a-e
Core Length: 4.4 ft

segment (ft)	description
0.0-1.4	Dark gray silt-clay mix. Organic material—sewage odor, woody material present. Shell fragments throughout.
1.4-1.5	Dark gray sand-silt mix, shading to dark brown sand. Shell fragments throughout.
1.5-2.4	Brown sand. Shell fragments throughout.
2.4-3.3	Coarse sand and gravel. Several large stones, larges @3" long and 1.5" across, others >1" in diameter, fairly smooth. Shell fragments throughout.
3.3-4.4	Brown sand. Shell fragments throughout.

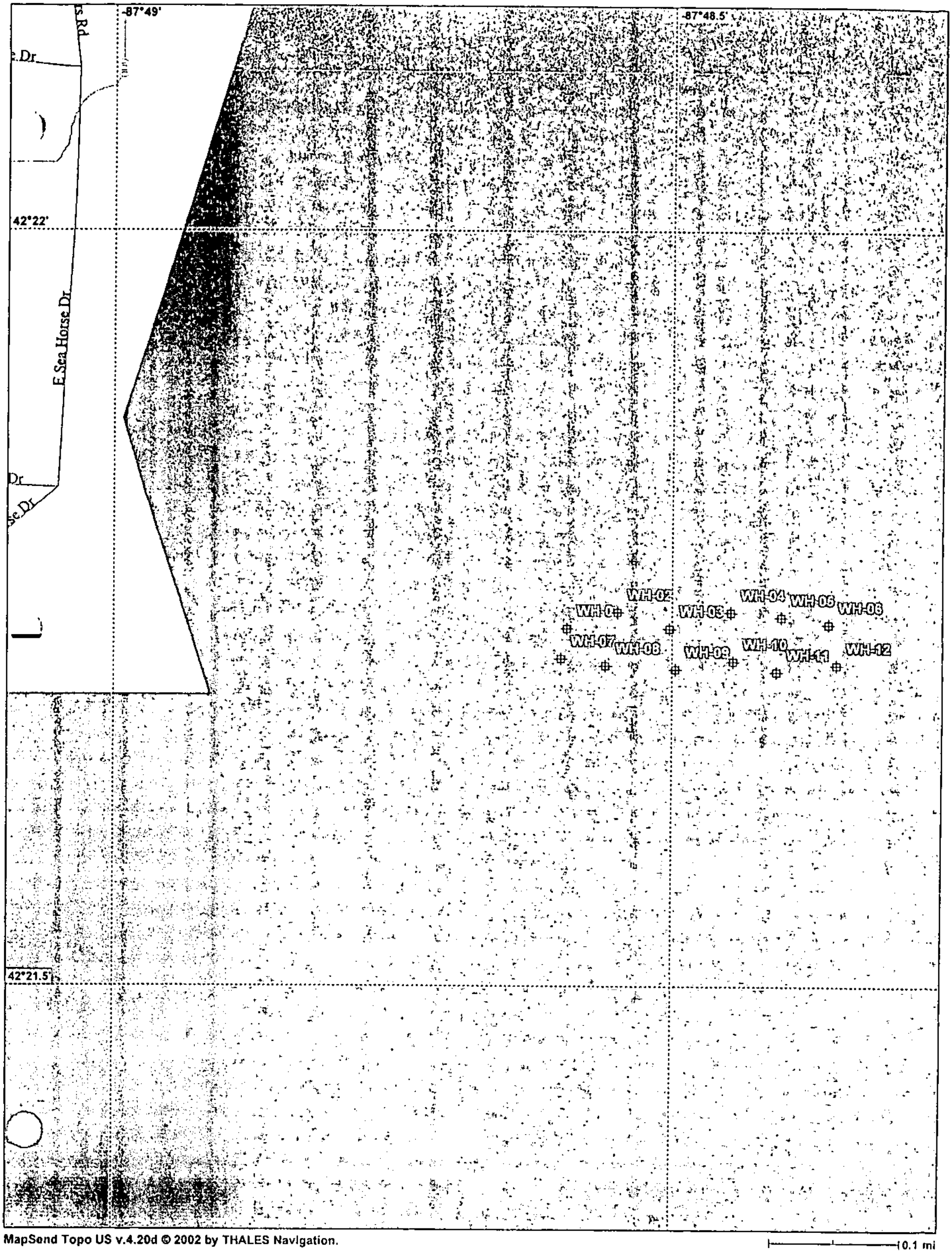
North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

NP12
Core # 176
Collected July 22, 2004
bagged NPM-12 a-e
picture NP12 a
Core Length: 2.4 ft

segment (ft)	description
0.0-0.3	Dark gray sand-silt mix shading to dark brown sand, shell fragments throughout.
0.3-2.4	Dark brown sand. Some gravel present, shell fragments throughout.



Waukegan Channel Vibrocores
Location of cores collected July 20, 2004
Illinois State WATER Survey (1895)
0
100
200
300
Meters
North Beach Park
Light
Lights
AQUEDUCT
592 X
B2
Waukegan Harb
Beach Park
WK1
WK2
WK3
WK4
WK5
WK6
WK7
WK8
WK9
WK10
WK11
WK12



MapSend Topo US v.4.20d © 2002 by THALES Navigation.

Waukegan Harbor GPS Log of Lake Sediment Samples Collected on July 20, 2004; CDB Project No. 102-311-707.
Vibracore Sampling Performed by the Illinois State Water Survey & Samples prepared in the ISWS Lab in Peoria, IL.

#	Name	Icon	Message	Latitude	Longitude	Altitude (ft)	Latitude (degrees)	Longitude (degrees)	Icon ID
1	WH-01	Crossed Square		N42°21.737	W87°48.593	0	42.36228333	-87.80988333	a
2	WH-02	Crossed Square		N42°21.748	W87°48.548	0	42.36246667	[illegible]	a
3	WH-03	Crossed Square		N42°21.737	W87°48.502	0	42.36228333	-87.80836667	a
4	WH-04	Crossed Square		N42°21.748	W87°48.448	0	42.36246667	-87.80746667	a
5	WH-06	Crossed Square		N42°21.740	W87°48.360	0	42.36233333	-87.80600000	a
6	WH-05	Crossed Square		N42°21.745	W87°48.402	0	42.36241667	-87.80670000	a
7	WH-07	Crossed Square		N42°21.717	W87°48.598	0	42.36195000	-87.80996667	a
8	WH-08	Crossed Square		N42°21.712	W87°48.558	0	42.36186667	-87.80930000	a
9	WH-09	Crossed Square		N42°21.710	W87°48.497	0	42.36183333	-87.80828333	a
10	WH-10	Crossed Square		N42°21.715	W87°48.445	0	42.36191667	-87.80741667	a
11	WH-11	Crossed Square		N42°21.708	W87°48.407	0	42.36180000	-87.80678333	a
12	WH-12	Crossed Square		N42°21.713	W87°48.352	0	42.36188333	-87.80586667	a

North Point Marina and Waukegan Harbor
Vibracore Chain of Custody Sheets
ISWS Peoria Sediment Laboratory
(July 20-22, 2004; collected by: KES, TES, JAS)

Location ID	Sample Number	Location Lat/Lon	Water Depth	Cored Depth	Capped Core Length	Time (capped) CST	Comments
WK1	156	N 42° 21' 44.2" W 087° 48' 35.6"	14.8'	10'	4.3'	8:05	WK1
WK7	157	N 42° 21' 43.0" W 087° 48' 35.9"	23.2'	8.3'	5.4'	9:05	WK7 Liner Seized in drive tube. Sample laid down before capping top; water siphoned off.
WK2	158	N 42° 21' 44.9" W 087° 48' 32.9"	18.8'	10'	6.6'	9:50	WK2
WK8	159	N 42° 21' 42.7" W 087° 48' 33.5"	25.3'	6.5'	4.1'	10:40	WK8
WK3	160	N 42° 21' 44.2" W 087° 48' 30.1"	25.0'	7.6'	5.0'	11:30	WK3
WK9	161	N 42° 21' 42.6" W 087° 48' 29.8"	24.6'	6.7'	1.9'	13:10	WK9 Struck solid substrate 6.7'. 2 failed attempts, sample loss during retrieve
WK4	162	N 42° 21' 44.9" W 087° 48' 26.9"	21.7'	10'	5.6'	14:35	WK4
WK10	163	N 42° 21' 42.9" W 087° 48' 26.7"	22.3'	9.5'	6.5'	15:15	WK10 Solid substrate @ 9.5'
WK5	164	N 42° 21' 44.7" W 087° 48' 24.1"	22.3'	10'	7.7'	15:45	WK5
WK11	165	N 42° 21' 42.5" W 087° 48' 24.4"	22.5'	10'	5.6'	16:25	WK11
WK6	166	N 42° 21' 44.4" W 087° 48' 21.6"	23.4'	9.5'	5.7'	17:00	WK6 Solid substrate @ 9.5'
WK12	167	N 42° 21' 42.8" W 087° 48' 21.1"	23.6'	8.8'	5.5'	17:30	WK12 Solid substrate @ 8.8'
NP5C	168	N 42° 28' 54.6" W 087° 47' 50.2"	14.6'	6.6'	3.0'	7:30	NP5C Prepped liner, on outside of Marina, old coordinates on top of reef; moved slightly to east. Solid substrate @6.6' bent drive tube.
NP5	169	N 42° 29' 15.9" W 087° 47' 55.1"	13.2'	7.6'	4.4'	10:15	NP5 First attempt solid substrates @ 4.6'. 2nd attempt moved 50 yards NE. Discarded 1st attempt.
NP4	170	N 42° 29' 17.5" W 087° 47' 57.7"	10.5'	10'	4.4'	11:30	NP4 first pull unsuccessful with single line. Hard substrate @ 7.0'. 2nd attempt w/ double line/ bent drive tube on retrieve. Kept 2nd attempt.
NP2C	171	N 42° 29' 17.7" W 087° 47' 57.5"	12.4'	7.0'	4.6'	7:15	NP2C Prepped liner. Solid substrate@ 7.0'
NP3	172	N 42° 29' 20.1" W 087° 48' 00.8"	12.3'	7.5'	4.2'	7:50	NP3 Solid substrate @ 7.5'. Top 4' of core very soupy/ sand water detritus.

North Point Marina and Waukegan Harbor
Vibracore Chain of Custody Sheets
ISWS Peoria Sediment Laboratory
(July 20-22, 2004; collected by: KES, TES, JAS)

Location ID	Sample Number	Location Lat/Lon	Water Depth	Cored Depth	Capped Core Length	Time (capped) CST	Comments
NP2C	173	N 42° 29' 21.3" W 087° 48' 03.0"	12.6'	9.6'	4.3'	8:25	NP2 Top 0.5' core very soupy; sand water detritus.
NP1C	174	N 42° 29' 21.3" W 087° 48' 02.8"	12.8'	9.2'	4.4'	9:05	NP1C Recpvered 4.6'. Cut off top 0.2'. Top 0.2' of core is in a bag. Single line pull.
NP1	175	N 42° 29' 21.6" W 087° 48' 06.2"	13.1'	10.0'	4.5'	9:55	NP1 First attempt failed.
NP12	176	N 42° 29' 21.9" W 087° 48' 09.5"	13.0'	10.0'	2.4'	10:40	NP12
NP6	177	N 42° 29' 18.2" W 087° 48' 02.3"	11.7'	10'	5.7'	12:15	NP6
NP7	178	N 42° 29' 16.3" W 087° 48' 01.2"	9.6'	10'	5.2'	12:40	NP7
NP8	179	N 42° 29' 13.2" W 087° 48' 00.3"	10.5'	10.0'	4.5'	13:30	NP8 Bent drive tube on first attempt. Solid just below surface.
NP3C	180	N 42° 29' 13.1" W 087° 48' 00.3"	10.2'	7.6'	4.7'	14:10	NP3C prepped liner; solid substrate @7.6'
NP9	181	N 42° 29' 10.6" W 087° 47' 59.4"	10.7'	6.5'	4.2'	14:55	NP9 Solid Susbrate @6.5'
NP10	182	N 42° 29' 07.7" W 087° 47' 58.3"	9.4'	6.5'	3.8'	15:35	NP10 first attempt solid substrate @ 5.2'. Solid substrate @ 6.5'. Second attempt kept.
NP4C	183	N 42° 29' 07.7" W 087° 47' 58.3"	8.3'	6.5'	3.4'	16:30	NP4C Prepped Liner. First attempt solid substrate @ 4.5'. Second attempt solid substrate @ 6.5'; kept.
NP11	184	N 42° 29' 05.2" W 087° 47' 57.5"	8.0'	6.5'	4.4'	17:00	NP11 Solid substrate @ 6.5'

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

WK1
Core # 156
Collected July 20, 2004
bagged WH-01 a-e
pictures WK 1a-d
Core Length: 4.3 ft

segment (ft)	description
0.0-2.0	Dark brown medium sand. Organic content—sewage odor, shell fragments throughout.
2.0-3.3	Dark gray sand-silt mix. Shell fragments throughout.
3.3-4.0	Dark brown sand. Shell fragments throughout.
4.0-4.3	Black silt. Woody material present, whole shells throughout.
	End of core loosely packed.

WK2
Core # 158
Collected July 20, 2004
bagged WH-02 a-e
pictures WK2 a-f
Core Length: 6.6 ft

segment (ft)	description
0.0-1.9	Dark gray and brown sand-silt mix. Organic content—sewage odor, woody material present, shell fragments throughout.
1.9-4.7	Dark brown sand. Shell fragments throughout.
4.7-4.8	Dark gray clay.
4.8-5.1	Dark brown sand. Shell fragments throughout.
5.1-5.2	Dark gray clay.
5.2-5.5	Dark brown sand. Shell fragments throughout.
5.5-6.6	Dark brown sand shading to dark gray sand-silt mix. Shell fragments throughout.
	Washout at end of core.

WK3
Core # 160
Collected July 20, 2004
bagged WH-03 a-e
pictures WK3 a-e
Core Length: 5.0 ft

segment (ft)	description
0.0-2.0	Dark gray sand-silt mix, shading to brown sand. Organic content—sewage odor, woody material present, shell fragments throughout.
2.0-2.3	Dark gray clay.
2.3-2.7	Sand, gravel. Heavy concentration of shell fragments around 2.5 to 2.7.
2.7-5.0	Dark brown sand, shading towards gray sand-silt mix. Shell fragments throughout.

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

WK4
Core # 162
Collected July 20, 2004
bagged WH-04 a-e
pictures WK4 a-e
Core Length: 5.6 ft

segment (ft)	description
0.0-1.0	Dark gray sand-silt mix. Organic content—sewage odor. Shell fragments throughout.
1.0-1.5	Dark brown sand. Shell fragments throughout.
1.5-1.7	Gray sand-silt mix. Shell fragments throughout.
1.7-1.9	Dark gray clay layer
1.9-5.6	Dark brown sand with some silt. Shell fragments throughout.

WK5
Core # 164
Collected July 20, 2004
bagged WH-05 a-e
pictures WK5 a-f
Core Length: 7.4 ft

segment (ft)	description
0.0-1.7	Dark gray sand-silt mix, shading to brown. Organic content—sewage odor. Shell fragments throughout.
1.7-7.4	Dark brown sand with some silt. Shell fragments throughout.

WK6
Core # 166
Collected July 20, 2004
bagged WH-06 a-e
pictures WK6 a-d
Core Length: 5.7 ft

segment (ft)	description
0.0-4.0	Dark brown sand, bands of silt throughout. Organic content—sewage odor. Shell fragments throughout.
4.0-5.7	Dark brown sand, some silt. Shell fragments throughout.

WK7
Core # 157
Collected July 20, 2004
bagged WH-07 a-e
pictures WK7 a-c
Core Length: 5.4 ft

segment (ft)	description
0.0-0.1	Gray, dark brown sand-silt mix. Organic content—sewage odor. Shell fragments throughout.
0.1-4.9	Dark brown sand. Some gravel present. Shell fragments throughout.
4.9-5.4	Dark brown sand, shading to dark gray sand-silt mix. Some gravel present. Shell fragments throughout.

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
ISWS—Peoria Sediment Laboratory
(August 2-3, 2004; Analyst: Joy Telford)

WK8
Core # 159
Collected July 20, 2004
bagged WH-08 a-e
pictures WK8 a-d
Core Length: 4.1 ft

segment (ft)	description
0.0-2.2	Dark gray sand-silt mix shading to gray and dark brown sand-silt mix. Organic content—sewage odor. Shell fragments throughout.
2.2-2.7	Coarse sand, some gravel. Small to medium stones, <1" in diameter, shell fragments throughout.
2.7-4.1	Brown sand, some silt. Shell fragments present throughout. Washout at end of core.

WK9
Core # 161
Collected July 20, 2004
bagged WH-09 a-e
picture WK9a
Core Length: 1.9 ft

segment (ft)	description
0.0-1.9	Dark gray and brown sand-silt mix. Organic content—sewage odor. Shell fragments throughout.

WK10
Core # 163
Collected July 20, 2004
bagged Wh-10 a-e
pictures WK10 a-e
Core Length: 6.5 ft

segment (ft)	description
0.0-1.4	Dark brown sand, some silt. Shell fragments throughout.
1.4	Dark gray silt-clay band.
1.4-1.9	Dark brown sand, some silt. Shell fragments throughout.
1.9	Dark gray silt-clay band.
1.9-2.8	Dark brown sand, some silt. Shell fragments throughout.
2.8-3.0	Dark gray silt-clay band, shading to light brown clay.
3.0-3.7	Dark brown sand, some silt. Shell fragments throughout.
3.7-3.8	Dark gray silt-clay band, shading to light brown clay.
3.8-5.1	Dark brown sand, some silt. Shell fragments throughout.
5.1	Dark gray silt-clay band.
5.1-6.5.	Dark brown sand, some silt. Shell fragments throughout.

WK11
Core # 165
Collected July 20, 2004
bagged WH-11 a-e
pictures WK11 a-f
Core Length: 5.6 ft

segment (ft)	description
0.0-1.5	Dark gray and brown sand-silt mix. Some organic content—sewage odor. Shell fragments throughout.
1.5-1.7	Dark gray silt-clay band.
1.7-1.8	Dark brown sand. Medium stones, fairly smoothed, shell fragments throughout.
1.8-5.6	Dark brown sand, some silt. Some gravel present, shell fragments throughout.

North Point Marina and Waukegan Harbor
Vibracore Sediment Descriptions
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WK12
Core # 167
Collected July 20, 2004
bagged WH-12 a-e
pictures WK12 a-e
Core length: 5.5 ft

segment (ft)	description
0.0-1.0	Dark gray and brown sand-silt mix. Some organic content—sewage odor. Shell fragments throughout.
1.0-3.4	Dark gray and brown sand-silt-clay mix. Shell fragments throughout.
3.4-4.4	Coarse sand, some silt and clay. Gravel and several large stones present, shell fragments throughout.
4.4-5.5	Dark brown sand with some silt. Shell fragments throughout.

FORM 11

BULK SAMPLE LABORATORY ANALYSIS REPORT

1. FACILITY: Grant Park Beach — 2. CDB BUILDING # NA
3. BUILDING: Beach Near Water Line — 4. CLIENT (A/E) UAS, Inc
5. ADDRESS: S Milwaukee, Wi — 6. PROJECT # 102-311-707
7. HOMOGENEOUS AREA (ONLY 1 PER FORM) MTA - Transite Debris

(A/E COMPLETE ITEMS 1-10 & provide to laboratory)

8. Location	Beach		
9. Date Collected	July 8, 2004		
10. Sample No.	MTA - 1		
11. Date Received	July 8, 2004		
12. Lab Sample No.	049845-01		
13. Color?	Gray		
14. Fibrous?	Yes		
15. Layers?	No		
16. Contain Asbestos?	Yes		
17. TYPE and % ASBESTOS			
Chrysotile	40		
Amosite			
Crocidolite			
Other			
Total Asbestos %	40		
18. OTHER MATERIAL %			
Fibrous Glass			
Cellulose			
Synthetic Fibers			
Gypsum			
Calcite			
Quartz			
Perlite			
Vermiculite			
Others	60		
19. Date Analyzed	July 9, 2004		
20. Analyzed by	Karla Smith-Kasten		

All samples analyzed by polarized light microscopy with dispersion staining.

21. Report approved by: [signature] — 22. Date: 7/9/2004

23. Laboratory Name: United Analytical Services, Inc.